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ABSTRACT

This occasional paper is intended to disseminate information from the project, Monitoring the Future. Each year since 1975, about 17,000 seniors have participated in the survey, which is conducted in some 130 high schools nationwide. In addition, subsamples of seniors from previously participating classes receive follow-up questionnaires by mail each year. Information from the follow-up studies is examined in this monograph. The information concerns changes in drug use during the first 10 years after high school, and specifically focuses on the ways in which social roles and experiences in post-high school years relate to the use of cigarettes, alcohol, marijuana, and cocaine. Chapter one is an introduction, and chapter two provides a description of the sample in terms of roles and experiences of each group at intervals post- high school. Chapters three, four, five, and six are devoted to types of drug use. Chapter seven summarizes the impacts of post-high school roles and experiences on drug use. Some general conclusions from the analyses include: (1) among full-time college students there is a larger than average increase in alcohol use; (2) being married is associated with reduction in use of alcohol; and (3) military service is associated with increased use of cigarettes and alcohol. (Contains 81 references and 26 tables) (JDM)

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CHANGES IN DRUG USE DURING THE POST-HIGH SCHOOL YEARS

Monitoring the Future Occasional Paper 35

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ABSTRACT

This monograph examines changes in drug use during the first ten years after high school. Specifically, it focuses on the ways in which social roles and experiences in the post-high school years relate to the use of cigarettes, alcohol, marijuana, and cocaine.

Chapter 1 is an introduction and overview, and Chapter 2 provides a description of the sample in terms of roles and experiences at each of five follow-up points (1-2, 3-4, 5-6, 7-8, and 9-10 years after graduation). Each of the next four chapters is devoted to one of the four types of drug use, first examining patterns of drug use change across each of the five intervals from senior year to follow-up, and then exploring multivariate relationships linking changes in drug use to the post-high school experiences. Chapter 7 provides a summary of the impacts of post-high school roles and experiences on drug use.

Several general conclusions emerged from these analyses:

1. Most of the impacts of post-high school student status and employment status overlapped greatly with the impacts of living arrangements, marital status, and parental status. We believe that decisions about post-high school education tend to influence choices about marital status and living arrangements, more so than the reverse; accordingly, we conclude that student and employment status do influence drug use, but these are primarily indirect effects via marital status and living arrangements.
2. Although there are many similarities across drugs in their relationships with post-high school experience, there also are clear differences. Patterns of change in cigarette use are in many respects distinct from those involving the other drugs, largely due to the high proportion of users who are nicotine dependent. Also, the illicit drugs show some patterns of relationship which contrast with those for the licit substances.
3. On average, age-related downturns in substance use take place during the mid-twenties. These declines occur primarily because at these ages increasing proportions of young adults become married, and many take on additional responsibilities such as pregnancy and parenthood.
4. The impacts of the post-high school experiences under study here on drug use seem the same in most respects for males and females, and for each of the five time intervals examined.

Many specific findings emerged from the multivariate analyses, including the following:

1. Among full-time college students there is a larger than average increase in alcohol use, which seems attributable almost entirely to the fact that college students are less likely than their age-mates to be married, but more likely to have left the parental home.

2. Full-time homemakers show greater than average declines in use of some drugs, and this seems explainable entirely in terms of their marital status and parental status.
3. Military service is strongly associated with *increased* use of cigarettes and alcohol, but *decreased* use of illicit drugs. These effects do not show substantial overlaps with the effects of marital status or parental status.
4. Being married is associated with a reduction in use of alcohol and the illicit drugs, but not in use of cigarettes.
5. Leaving the parental home, while remaining unmarried, is associated with increases in alcohol use and illicit drug use.
6. Living in a dormitory is associated with increases in use of alcohol and marijuana, but not cocaine.
7. Women who are pregnant show distinct decreases in drug use; this includes declines in cigarette use, a behavior which changes little in relationship with the other transitions under study here.
8. Men with pregnant spouses show decreases in alcohol use, but not cigarette use.
9. Being a parent is associated with declines in alcohol and illicit drug use, and this is in addition to any effects of current pregnancy.

CHAPTER 1. INTRODUCTION AND OVERVIEW

> Young lives growing and changing and moving through time are among the most elusive and and refractory of all objects of scientific inquiry. Jessor, Donovan, & Costa (1991, p. 3)

This much is certain: Substance use typically declines during young adulthood. There is little certainty about why such declines occur. The present large-scale investigation was undertaken to provide some clarity about the causes of changes in drug use between late adolescence and young adulthood. An essential feature of this investigation is the use of national, multi-cohort, panel data drawn from the Monitoring the Future study.

CONCEPTUAL OVERVIEW

Our approach in this monograph, and more broadly in the Monitoring the Future project, has been informed by several conceptualizations consistent with a life-span perspective on human development (e.g., Baltes, 1987; Baltes, Reese, & Lipsett, 1980; Featherman, 1983; Lerner, 1984, 1986; Pandina, Labouvie, & White, 1984). In addition to subscribing to the basic tenet of the life-span perspective that "humans have the capacity for change across the entire life-span" (Brim & Kagan, 1980, p. 1), we believe that the explanation for change and stability is not necessarily located in the distal developmental past, but rather in the more proximal developmental past and present circumstances. We envision intra-individual change and stability to be a function of both individual and contextual factors—the individual acting upon and reacting to the environmental system in which he or she is embedded (Bronfenbrenner, 1979; Lerner, 1986). We recognize, of course, that not all contextually-influenced change operates within an age-based framework; in addition to normative age-related events, there are history-graded events (i.e., secular trends or cohort effects), and non-normative events.

Our general concern is with change and stability in drug-related behaviors and attitudes during the transition to young adulthood. In many respects, change in drug-related behaviors and attitudes should be expected. Much of the drug and alcohol use during adolescence can be considered as "experimental," perhaps even part of the identity exploration process (e.g., Jones & Hartman, 1988). This is not to deny the seriousness of drug and alcohol use during adolescence, for certainly there are some adolescents whose drug use sets them on a life-long course of continued drug use. Nevertheless, it is clear that many adolescents engage in some level of experimentation without forming any type of consistent pattern of use, suggesting a fair amount of intra-individual discontinuity between adolescence and young adulthood. At the same time, the transition to young adulthood is likely to be accompanied by important discontinuities in a given individual's immediate and distal contexts. Many of these discontinuities, such as the transition into parenthood, can be accompanied by important personality and attitude changes (e.g., Antonucci & Mikus, 1988). Bronfenbrenner (1979) has termed such contextual discontinuities as "ecological transitions," emphasizing the point that change is occurring at a *systems* level, a point similar to Lewin's (1939) notion regarding the expansion of an individual's life-space during developmental transitions. Brand new immediate contexts (e.g., new school, new job, new home, marriage) emerge during the transition that can alter patterns of use or non-use of substances. Similarly, roles can change within continuing immediate contexts (e.g., with family of orientation), and such changes also can serve to alter the patterns.

In several other respects, however, stability of drug use patterns can be expected during the transition to young adulthood. There is no doubt that some of the changes that occur during the transition to young adulthood are powerful and pervasive, but an abundance of evidence indicates that many individual characteristics (e.g., personality, coping styles) are quite robust and stable (e.g., Troll, 1985), perhaps more than a match for the forces of change that are evident during the transition. In addition, it is likely that drug and alcohol use patterns for many adolescents and young adults reflect some form of dependency. Thus, at the intra-individual level, there is good reason to expect some stability in drug use between adolescence and young adulthood. This is also the case at the contextual level. There are some important immediate contexts that undergo little change during the transition. In particular, for some young adults, there may be little change in friendship groups. Given the evidence concerning peer influences on drug and alcohol use, the lack of change in the peer context would suggest a lack of change in drug and alcohol use and non-use patterns. Also, a number of young adults today remain living in the same parental home environment well past their completion of secondary school, holding constant many of the restraining forces of that environment.

Our conceptual approach emphasizes both change and stability in drug use patterns; however, here our primary concern is with the identification of those factors that serve to alter drug use over time. Below, we provide a brief and selective consideration of some of the conceptual issues relevant to understanding change during the transition to young adulthood.

Overview of the Transition to Young Adulthood

The transition to young adulthood is a critical developmental transition. The individual's decisions and experiences during this transition can have powerful reverberations throughout life (Clausen, 1991; Jessor, Donovan, & Costa, 1991). Certainly, much of an individual's "foundation" is set, and many initial decisions regarding future plans are made, prior to leaving high school. But the actual experiences of young adulthood—the joining of intentions and realities, the deflections of initial plans and making of new ones, the episodes of successes and failures with the various normative tasks, the taking of one path that forecloses the taking of another—set the stage for the course of adult life.

The transition from adolescence to young adulthood shares many features with the transition from childhood to adolescence: it is characterized by new and more demanding social opportunities and expectations, an expanded "life-space" (cf. Lewin, 1939), changes in self-definition—in short, new freedoms and new responsibilities (Petersen & Ebata, 1987). As can be the case during adolescence, the first years of young adulthood may involve more in the way of new freedoms than new responsibilities. At best, this combination of new freedoms with relatively few responsibilities can contribute to a period of psychosocial moratorium (Erikson, 1968) that can be used to explore one's identity and experiment with different roles. At worst, it can represent a profound lack of adult opportunities, particularly in the world of work for non-college youth (e.g., Dryfoos, 1990; Hamilton, 1990). In either case, we view the coupling of new freedoms with few responsibilities as providing the opportunity for increased drug use, an opportunity that dissipates as adult responsibilities are assumed.

Compared to what the scientific community knows about other points along the life-course, relatively little is known about the transition to young adulthood (Jessor et al., 1991). One reason for this lack of knowledge is also a reason why the transition to young adulthood can be difficult to transverse. Specifically, unlike the transition to adolescence, there is relatively little clarity or uniformity in the transition to young adulthood. Whereas puberty clearly marks the beginning of adolescence, there is no such corresponding universal marker for the beginning of young adulthood. Likewise, whereas the role options and activities open to young adolescents are comparatively limited and uniform, those open to young adults are extensive and varied. Furthermore, the tasks and experiences of adolescence often have little connection to the tasks and experiences of young adulthood, and there is little coherent institutional structure to facilitate the transition (Hurrelmann, 1990; William T. Grant Foundation Commission on Work, Family, and Citizenship, 1988).

Another major reason comparatively little is known about the transition to young adulthood is that following adolescents into young adulthood is difficult from a practical standpoint. At no other point along the lifespan is geographic dispersal so sudden and so great as it is during the first few years following high school graduation. As a consequence, studies that have tracked adolescents into young adulthood are relatively rare. More common are studies that begin during college. Such studies are certainly important, but they do not permit a direct examination of pre-transitional conditions; more critical is that such studies neglect over half of the young adult population (cf. William T. Grant Foundation Commission on Work, Family, and Citizenship, 1988). Another difficulty in studying the transition to young adulthood is amassing enough individuals to represent adequately the wide variation in post-high school experiences. Without large representative samples of panel data, it is difficult to make broad generalizations about the experiences and impacts of young adulthood. Even in most studies of college students, the institution specific samples are often so limited, when drawn from a very heterogeneous population of institutions, as to make their generalizability to all college students questionable.

The Normative Tasks and Experiences of Young Adulthood: The Push and Pull of Change

The primary normative roles of adolescence are student, part-time worker, son/daughter/sibling, and friend; those of adulthood include worker, spouse/parent, and citizen. Between the departure from adolescent roles and the assumption of adulthood roles, the parameters of the normative tasks and experiences during the transition to young adulthood are set by the new social environments (including college, military service, civilian employment, homemaking, unemployment), as well as the new role responsibilities (including marriage, pregnancy, parenthood, financial independence).

Havighurst (1972) conceptualized normative developmental tasks to be those socially prescribed tasks that one is encouraged to undertake at specific times along the life course. Success in these tasks leads to social approval, happiness, and success with future developmental tasks. In his psychosocial theory of human development, Erikson (1968) provides a similar perspective on the progressive nature of developmental tasks. To the benefit of the individual and society, the tasks of adolescence and young adulthood are formulating an identity (including a vocational identity) and establishing intimacy. According to Erikson, one must struggle to resolve successfully these tasks; the result of failure is continued difficulty throughout the life course with issues of identity and intimacy, as well as difficulty in resolving later developmental tasks such as generativity and ego-integrity.

Both Havighurst (1972) and Erikson (1968) indicate that the points at which these developmental tasks occur represent "critical periods." That is, unless the given tasks are resolved at the prescribed times along the life course, they will never be adequately resolved. While we, along with a number of lifespan oriented scholars (e.g., Baltes, 1987; Lerner, 1984; Troll, 1985), would argue against the notion that young adulthood represents a "do-or-die" critical period during which the several normative tasks related to identity and intimacy must be resolved, we do agree that young adulthood represents an important "sensitive period" (cf. Lerner, 1984), or "teachable moment when the body is prepared for, culture is pushing for, and the individual is reaching out for the achievement of some developmental change" (Goldberg, 1988, p. 5). That is, in the context of new social environments and role responsibilities that occur during young adulthood, there are incentives and opportunities for important individual changes. Relevant change can and does occur at other points along the lifespan, but it is during young adulthood that the motivation to disengage from some old roles and behaviors and create and integrate new ones is strongest (e.g., Antonucci & Mikus, 1988).

Changes in Drug Use During the Transition to Young Adulthood

It has long been recognized that drug and alcohol use tend to decline during the middle to late twenties, about the same time when individuals typically assume adulthood roles related to marriage, parenthood, and full-time employment, suggesting a causal relationship between the successful assumption of adulthood roles and decline in drug use (e.g., Bachman, O'Malley, & Johnston, 1981, 1984; Donovan, Jessor, & Jessor, 1983; Jessor et al., 1991; Kandel, 1984; O'Malley, Bachman, & Johnson, 1984, 1988; Zucker, 1979, 1987). Against the backdrop of the strong incentives and opportunities for change mentioned previously, there are several reasons why the assumption of some adult roles would contribute to a decline of drug use. For example, Kandel (1984) and Yamaguchi and Kandel (1985) suggested that illicit drug use is incompatible with the responsibilities typical of normative adulthood roles; the resolution of the dissonance is either through role socialization (i.e., decrease drug use) or role selection (i.e., avoid the incompatible role). Jessor et al. (1991) suggest that the assumptions of adulthood roles have a "conventionalizing" influence, in which individuals become more conventional and hence less prone to problem behavior as they make the transition. A similar notion is that individuals become more invested in conforming to predominant norms as they assume adulthood roles—they have more to gain by following, and more to lose by straying from, socially accepted practices that typically do not involve excessive drug use. Another important factor is simply logistics: the time and energy involved in many adulthood roles is prohibitive of excessive drug use. Although we have suggested that the transition to young adulthood may begin with more freedom than responsibility, the actual assumption of adulthood roles is likely to involve the opposite—more responsibility than freedom. Consider, for example, this description of the demands and responsibilities of parenthood:

> The labor-intensive nature of caring for young children means that people devote enormous amounts of physical time, energy, and effort to enacting the parental role; parents are parents 24 hours per day, seven days per week, year after year, and for most people, the parental role is irrevocable and continuous. At the same time, this physical intensity is paralleled, or exceeded, by the emotional intensity of parenthood (Antonucci & Mikus, 1988, p. 65).

Clearly, there is great potential for change in drug use during the transition to young adulthood because of the synergism of normative developmental tasks, social roles and expectations, and logistical constraints and opportunities.

Unfortunately, the empirical evidence regarding such change in drug use is limited. A number of longitudinal studies have followed young people from adolescence into young adulthood and looked at change in drug use; these include the Youth in Transition study (Bachman, Johnston, & O'Malley, 1978; Johnston, 1973), and studies by Brunswick, Messeri, and Titus (1992), Jessor and colleagues (Jessor et al., 1991; Donovan et al., 1983), Kandel and colleagues (e.g., Yamaguchi & Kandel, 1985), Kaplan and colleagues (e.g., Johnson & Kaplan, 1991), Newcomb & Bentler (1987), Elliott, Huizinga, and Menard (1989), O'Donnell, Voss, Clayton, Slatin, & Room (1976), and Robins (1974). However, those that have been national in scope are few (Elliott et al., 1989; O'Donnell et al., 1976; Robins, 1974; Youth in Transition), and even fewer have included broadly representative samples. For example, the Youth in Transition, O'Donnell et al. (1976), and Robins (1974) studies did not include females. In sum, relatively few studies have been able to look at the impacts of post-high school environments on drug use with reasonably representative samples.

Getting married and becoming parents are two role transitions that have engendered much empirical consideration. For example, cross-sectional studies have shown lower rates of drinking among married people as compared to unmarried people, but these differences could be due to selection effects. In a recent longitudinal study of 458 newly married 24-year olds in New Jersey, Horwitz and White (1991) found that problem drinking declined among women, but not among men. Miller-Tutzauer, Leonard, and Windle (1991) also used a longitudinal design to examine changes in alcohol use after marriage; they found that married individuals moderated their alcohol consumption after marriage, but that the effect stabilized shortly after marriage, apparently within one year. Donovan et al. (1983) found declines in problem drinking after marriage. Yamaguchi and Kandel (1985) reported declines in marijuana use after marriage among women, but not among men, although there were declines among both men and women in the year preceding marriage. Brunswick et al. (1992) reported changes in "heavy drug use" (including both marijuana and cocaine) as a function of marriage for women, but not for men. Newcomb and Bentler (1987) reported that marriage significantly decreased the use of alcohol, marijuana, and cocaine for women.

In recent years there has been considerable increase in the scientific evidence that drug use by pregnant women can have substantial effects on their infants. For some time it has been known that heavy alcohol use by pregnant women is associated with fetal alcohol syndrome, but more recent evidence points to possible effects even from usage levels previously thought to be moderate. Cigarette use also has been demonstrated to be harmful to the developing fetus. McDonald, Armstrong, and Sloan (1992) reported that cigarette and alcohol use had significant effects on rates of spontaneous abortion and low birth weights. Marijuana smoking during pregnancy also has been implicated in low birth weight (Hatch & Bracken, 1986) and decreased length of gestation (Fried, Watkinson, & Willan, 1984). Although previously viewed as a relatively "soft" drug, cocaine has become recognized as a drug with particularly serious implications for the fetuses of women who use it (Chasnoff, 1991). Smoking crack cocaine in particular became more widespread in some areas among young women of child-bearing age, and as a consequence, there has been a good deal of publicity about the problems of "crack babies."

In light of this evidence, it is not surprising to find that more young women are taking seriously the message about drug use and possible effects on a fetus, consequently reducing their drug use during pregnancy. For example, Yamaguchi and Kandel (1985) reported some evidence indicating a decline in use of marijuana among pregnant women, and possibly among the spouses of pregnant women. Fried, Barnes, and Drake (1985) interviewed 288 pregnant women during the course of pregnancy and found that use, particularly heavy use, of both nicotine and alcohol declined significantly during pregnancy. Ihlen, Amundsen, Sande, and Daae (1990) reported significant reductions in alcohol drinking, cigarette smoking, and use of illegal drugs during pregnancy in a sample of 416 women. However, these studies have generally been based on small samples, often clinical and often nonrepresentative. Here we look at the issue using large nationally representative samples.

There is some limited evidence suggesting that the establishment of one's career (e.g., in, or moving directly toward, a job to which one aspired) is negatively correlated with excessive alcohol use, especially among males (Frank, Jacobson, & Tuer, 1990). A related and often overlooked worker role is military service, and the small amount of literature on this topic points toward the need for cohort sensitive data. In reviewing several large-scale surveys some years ago, Segal (1977) concluded that illicit drug use was clearly higher among those in military service. Data from Johnston (1973) were consistent with that conclusion; and Robins (1974) reported very high levels of marijuana and heroin usage among young men returning from Vietnam. In seeming direct contradiction to those findings, O'Donnell et al. (1976) found virtually no difference in mean scores on an index of illicit drug use between those who served and those who did not. However, O'Donnell's sample covered a ten-year age span corresponding roughly to the high school classes of 1962 through 1972. Closer inspection revealed that marijuana and heroin use figures for those who were in Vietnam during the last years of the war correspond rather well with those from the Robins study. In other words, there appears to have been a cohort difference even in the relative standing of those in military service versus those in civilian life, and the findings from one period are simply not generalizable to the other. Indeed, in an analysis of a more recent cohort (i.e., senior year cohort of 1976), Johnson and Kaplan (1991) found little difference in terms of the rates of initiation of marijuana use and of escalation to daily marijuana use as a function of military status. More recently, however, the military services have undertaken extensive, and apparently successful, efforts to reduce the levels of illicit drug use among their personnel, which may have led to a still different comparison result vis a vis the civilian labor force.

Accounting for Age-Related Changes in Drug Use

To what extent can the typical age-related changes in drug use during young adulthood be explained in terms of the important role transitions which occur during that period? That is one of the central questions explored in the present monograph. We noted above that declines have been observed in the drug use of young adults during their mid-twenties, and we cited evidence that such changes may be attributed partly to transitions in role responsibilities such as marriage, pregnancy, parenthood, and career establishment. We will look separately at each of a number of dimensions of post-high school experience, as well as how they work in combination to influence drug use. But another question of interest here is whether such factors, taken in combination, can explain those typical changes in drug use which occur as young adults move out of their teens and through their twenties. Our panel data are well suited to exploring such questions, and our analysis methods have been designed to do so. We turn next to a brief overview of the purposes of this monograph.

FOCUS AND PURPOSES OF THIS REPORT

Our purpose in this monograph is to examine and explain changes in drug use during adolescence and young adulthood, beginning with the senior year of high school. More specifically, we explore the ways in which social roles and experiences in the post-high school years relate to, and may influence, the use of drugs. We focus separately on cigarette use, alcohol use, marijuana use, and cocaine use. For each drug we report how levels of use and changes in use are linked to the new roles and experiences which confront young adults in their first ten years after leaving high school.[1]

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[1] The full range of research objectives of the Monitoring the Future study is outlined in an earlier paper in this series (Johnston, O'Malley, Bachman, & Schulenberg, 1992).

These experiences during the first years of young adulthood are interconnected in many ways; moreover, they may be closely linked to prior differences in background and experience. Thus the major objective of this report is to address complex questions involving causation and overlapping patterns of causation. These questions are of practical importance, of course, to those concerned with preventing or remediating drug abuse. In addition, the questions are of considerable theoretical importance, because much of the drug use among youth and young adults seems heavily influenced by social factors such as strong, sometimes conflicting, norms and pressures from parents and peers (Bachman et al., 1984; Kandel, 1978).

In this monograph we strive to report our findings in formats which are clear, provide useful descriptive detail, and are readily interpretable. This emphasis on clarity of description reflects our desire to exploit fully the breadth and quality of the data available for these analyses.

Scope of Samples and Breadth of Generalization

The findings reported herein are drawn from the Monitoring the Future project; for these analyses we employ large nationwide samples covering thirteen cohorts of high school seniors (classes of 1976-1988) followed biennially for up to ten years beyond high school. Because of this very broad coverage in terms of both time and geography, the findings are more useful descriptively and more widely generalizable than is typically the case for panel studies of drug use. At the same time, we must caution that our findings do not include the entire age cohort. The fifteen to twenty percent of young people who do not graduate from high school are not included in the initial sampling, and the additional losses of respondents who do not return follow-up questionnaires further restrict our ability to generalize. Nevertheless, these findings constitute important information about the large majority of high school graduates during the late 1970's and throughout the 1980's; moreover, it seems highly likely that many of the basic relationships found for these samples hold true for even larger proportions of young adults, and extend over longer time periods.

Scope of the Present Analyses

Patterns of drug use among youth and young adults are influenced by a wide range of factors, including cultural contexts, individual differences, and a variety of social contexts and social roles. Individuals differ widely in terms of family background, interests, attitudes, aptitudes, developed abilities, and early experiences; such differences play a vital role in determining which individuals are more likely to engage in drug use (i.e., are more susceptible or more "at risk"). There are also important differences in social contexts; these range from very broad demographic factors such as historical period, region, and urbanicity, to more specific contexts such as community, school, church, work, and other organizational settings, to still more personal social contexts such as living arrangements. The adoption of various social roles, such as becoming a spouse, parent, college student, or worker is of demonstrated importance, as well.

The Monitoring the Future project is designed to explore a wide range of the factors mentioned above. The present analyses focus primary attention on one set of factors, those having to do with role experiences and responsibilities during the first ten years after high school; however, other analyses from the project have dealt with many other factors, and the findings from those analyses have been taken into account in the present work. In particular, several analyses have shown that a variety of background and lifestyle factors measured at the end of high school are related to drug use (Bachman, et al., 1984; 1986), and such factors are included as control variables in the present analyses. Also, several analyses have shown that age, period, and cohort all have important effects upon the use of one or more drugs (O'Malley et al., 1984; 1988); the present analyses have incorporated various controls for period and cohort effects, while focusing on the potential explanations for age-related effects.

Studying Causal Relationships in Natural Settings

The present study is like many other social psychological studies in that it examines individuals (survey respondents) in "natural settings" rather than groups of people (subjects) randomly assigned to various experimental treatments. The fundamental problem with such survey studies is, of course, that "assignment" to the various social contexts of interest is anything but random. The roles and experiences of early adulthood (e.g., college versus military service versus civilian employment, or living with parents versus a spouse versus others) differ from one individual to another based on the individuals' own backgrounds and prior behaviors, as well as the (non-random) choices of many others. Thus, in the present study, even when we find that important differences in drug use are *correlated with* certain post-high school experiences, we are left with the problem of ascertaining whether such differences in drug use are properly interpreted as having been *caused by* the various post-high school experiences.

It is axiomatic that studies in natural settings can provide no certain demonstration of causation—the possibility always remains that other (unexamined) factors are more fundamental causes, and that our conclusions about causation are therefore spurious. Although panel data following the same survey respondents across a number of years can be helpful in ruling out some such alternative explanations and in demonstrating temporal sequences of events consistent with a favored interpretation, it is a mistake to assume that panel data are sufficient to establish causation with certainty. A point made in an earlier monograph bears repeating here: "Unfortunately, panel data are not a panacea, and it has come to be recognized that the causal interpretation of relationships observed with panel data depends just as surely as in the case of cross-sectional data on the imposition of a causal model" (Rodgers & Bachman, 1988, p. 90).

It is also axiomatic that studies in natural settings can lead to erroneous conclusions if the analyses fail to include all important explanatory variables (i.e., if the implicit or explicit causal model is misspecified). One cannot argue with that assertion, at least in principle. In practice, however, the problem is how to figure out everything that might be relevant, measure it accurately, and then fit it all into an analysis model without overtaxing the capabilities of computer programs as well as human interpreters. Our approach to this practical problem in the present monograph has been to focus on one area (post-high school roles and experiences) in considerable detail, while at the same time attempting to provide adequate statistical controls for other relevant factors. Later in this introductory chapter we outline our analysis strategy for accomplishing these purposes, and in Chapter 3 we provide a much more detailed explanation. First, however, we provide an overview of the Monitoring the Future samples and methods.

SAMPLES AND METHODS

An earlier paper in this series describes the design and procedures for the Monitoring the Future project, and includes considerable detail on sampling methods, response rates, measurement content, and issues of validity in self-reports of drug use (Bachman, Johnston, & O'Malley, 1991a). The annual monographs on trends in drug use and related factors (e.g., Johnston, O'Malley, & Bachman, 1992) also provide considerable detail on methods. Our discussion here is limited to key features of the design, plus matters specific to the present analyses.

Samples

From its outset, the Monitoring the Future project was designed with two interrelated components: (1) annual nationwide surveys of high school seniors using group administered questionnaires, and (2) periodic follow-up questionnaires mailed to subsamples of each senior class cohort. This cohort-sequential design permits a wide range of analyses, including the study of longitudinal changes reflecting the differential impacts of various post-high school environments and role transitions.

Multi-Stage Samples of High School Seniors. Samples of seniors are drawn by a multi-stage procedure: the first stage consists of geographic areas (the Survey Research Center's 84 primary sampling areas throughout the coterminous United States); the second stage is the selection of one or more schools in each area (a total of 130 to 140); and the third stage is the random selection of up to about 350 seniors per school (yielding nationally representative cross-sections totalling about 16,000 to 18,000 high school senior respondents each year).

Follow-Up Samples of Young Adults. For reasons of cost control and sampling efficiency, only a subset of each senior class sample is selected for follow-up. Two subsamples from each senior class are drawn, each numbering about 1,200; members of one group are invited to participate in a follow-up survey one year after graduation, and every two years after that; those in the other group are invited to participate two years after graduation, and every two years after that. The follow-up samples are drawn using stratified random procedures; they are self-weighting, with one important exception as noted below.

Use of Sample Weights in these Analyses. Because the primary focus of the Monitoring the Future project is on drug use, those who as seniors used illicit drugs are oversampled by a factor of three to one. Our analyses assign a weight of 0.333 to each of these individuals (with all others weighted 1.000), thereby removing any bias that would have resulted from the oversampling. The numbers of cases reported herein are always the weighted Ns, which we consider to be a reasonably good indicator of the levels of accuracy provided by these samples.

There is room for argument about whether weighted or unweighted data should be used in multivariate relational analyses (e.g., Andrews, Morgan, Sonquist, & Klem, 1973; Lee, Forthofer, & Lorimor, 1989). On the one hand, use of weights generally reduces systematic biases in representing the sampled population. On the other hand, if the dataset includes a few cases with especially large weights, the danger exists that random idiosyncratic data for some such cases would influence the patterns of findings disproportionately. As noted above, the present analyses involve no such large weights (the large majority of cases are weighted 1.000, and all others are 0.333). In other words, we are using what might best be described as samples which are largely self-weighting (i.e., largely unweighted), with the exception that there is a modest degree of additional accuracy for those individuals who were in the stratum consisting of senior year illicit drug users.

One further consideration is that clustered samples are generally less accurate than simple random samples of the same size. This is indeed the case for samples of high school seniors because of the relatively large numbers of cases clustered in each sample school and the variation in sample weights; however, the follow-up surveys involve distinctly smaller clusters of cases per school and (as noted above) little variation in weights. Thus it is estimated that the present follow-up samples have levels of accuracy fairly comparable to simple random samples of the same size.[2]

Samples Included in These Analyses. Extensive follow-up data are available from all senior class cohorts from 1976 onward. At the time the final sets of analyses were initiated, the 1989 follow-up data were the latest available. We chose to analyze up to five follow-ups (if available) for each cohort. Accordingly, the present analyses include the senior classes of 1976 through 1988, with each class followed for up to ten years but no later than 1989. The following diagram summarizes the samples included, showing for each senior class the date of the senior year (i.e., base-year) data collection (BY) and the dates for each of the five follow-up data collections (FU1 through FU5). Recall that *two* subsamples from each senior class are being followed—one on odd years, the other on even years.

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[2] For further discussion of the issue of sample accuracy and design effects, see Bachman et al. (1991a).

Senior Class:	Year of Data Collection: 76	77	78	79	80	81	82	83	84	85	86	87	88	89
1976	BY	FU1	FU1	FU2	FU2	FU3	FU3	FU4	FU4	FU5	FU5			
1977		BY	FU1	FU1	FU2	FU2	FU3	FU3	FU4	FU4	FU5	FU5		
1978			BY	FU1	FU1	FU2	FU2	FU3	FU3	FU4	FU4	FU5	FU5	
1979				BY	FU1	FU1	FU2	FU2	FU3	FU3	FU4	FU4	FU5	FU5
1980					BY	FU1	FU1	FU2	FU2	FU3	FU3	FU4	FU4	FU5
1981						BY	FU1	FU1	FU2	FU2	FU3	FU3	FU4	FU4
1982							BY	FU1	FU1	FU2	FU2	FU3	FU3	FU4
1983								BY	FU1	FU1	FU2	FU2	FU3	FU3
1984									BY	FU1	FU1	FU2	FU2	FU3
1985										BY	FU1	FU1	FU2	FU2
1986											BY	FU1	FU1	FU2
1987												BY	FU1	FU1
1988													BY	FU1

In sum, these analyses made use of virtually all of the follow-up data available at the time these analyses were beginning; the only exception was that we did not include the relatively small amount of information available for those whose participation already extended beyond ten years. This decision to use nearly all available panel data means that there is a ten year follow-up span for the classes of 1976 through 1979, whereas for each successive class the available span is smaller. We discuss later, in the section on Analysis Strategy, the steps that were taken to ensure that this differential representation did not distort our findings.

Focus on Those Who as Seniors Were Unmarried Living with Parents. A small portion of the cases for whom we had data were excluded from the present analyses. Specifically, we restricted these analyses to include only those who *as seniors* were unmarried, living with parents or guardians, and not living with any children of their own. This had the effect of excluding only about four percent of the follow-up cases. The rationale for this restriction is discussed in the Analysis Strategy section below; in brief, we wished to focus on the variety of post-high school transitions in which many young adults leave one or more of the *typical* or *standard* role arrangements which apply to nearly all high school seniors (i.e., students, unmarried, and living with parents). Had we retained the small numbers of cases who were already in different living arrangements as seniors, we would have introduced a corresponding amount of complexity and "noise" into the analyses. We preferred instead this small additional restriction in our samples for these analyses.

Representativeness of Samples. We have already noted that the samples used for these analyses were restricted such that they fall short of representing the full cohorts of young adults in the periods studied. Most importantly, the base-year data collections sampled high school seniors, and thus omitted individuals who left high school before the end of the senior year.

In addition, representativeness is affected by nonparticipation at several points in the sampling process. First, about 25-30 percent of the schools initially invited to participate in the surveys each year declined to do so; however, in almost every such instance a similar school was recruited as a replacement. Second, about 15-20 percent of sampled seniors in participating schools did not complete questionnaires, due largely to absenteeism; other analyses indicated that this produced only modest amounts of bias in self-reports of drug use (Johnston, O'Malley, & Bachman, 1991). Third, by the fifth follow-up 9-10 years after high school, the total panel attrition reached about 30 percent. This panel attrition generated some degree of bias; fortunately, along most dimensions the bias was small, as documented in Chapter 2, and we suspect that any bias in *relationships* is even smaller. (For more extensive treatments of Monitoring the Future participation rates, representativeness, and validity, see Bachman et al., 1991a; see also Johnston et al., 1991.)

Any nonparticipation in sample surveys is undesirable, of course; still, it should be noted that the sample losses described above are generally lower than those reported for most other panel studies of drug use in adolescence and young adulthood. Moreover, although the sample losses among seniors and the panel attrition during follow-ups did produce some distortion, the panels still retain a broad range of variation on all of the measures examined here, thus giving us considerable confidence that overall patterns of relationships are well represented in these samples.

In sum, there are limitations to our ability to generalize because (a) several restrictions had to be imposed in defining target samples, (b) there were some losses sustained in the senior year surveys, and (c) there was also panel attrition. Nevertheless, the panel data still cover a broad spectrum of the high school senior population, and a wide range of post-high school behaviors. Moreover, the numbers of cases are sufficiently large that we are able to analyze subgroups constituting only small proportions of the total samples. Obviously, it is impossible for small subgroups to account for large portions of the total variance in drug use; nevertheless, we will see a number of instances where the findings for such subgroups stand in sharp contrast to the rest of the sample. As discussed below, our analysis methods are designed to take advantage of the sample size and display such subgroup differences clearly.

Survey Methods

Questionnaires. All of the Monitoring the Future surveys use self-completed questionnaires which are formatted for optical scanning. Although multiple questionnaire forms have been used each year in order to broaden the total coverage, only items which appear in all forms were used in the present analyses. The specific measures used are introduced in subsequent chapters; for further details on questionnaires and measurement content, see Bachman et al. (1991a).

Base Year Surveys of High School Seniors. Each spring the surveys of seniors are administered during regularly-scheduled class periods by locally based institute for Social Research representatives and their assistants. Respondents are asked to provide their names and addresses on forms which are then separated from the questionnaires (but linkable by code numbers accessible only to research staff).

Follow-Up Surveys of Young Adults. Follow-up questionnaires, similar in most respects to the base-year questionnaires, are sent in the spring by certified mail and accompanied by a five dollar respondent payment check. Additional reminder mailings are sent to nonrespondents, and after several weeks attempts are made to telephone all outstanding cases in order to prompt their response.

ANALYSIS STRATEGY

We have found that the clearest way to present the details of our analysis approach is to use actual data; accordingly, we have reserved that presentation for Chapter 3, as an integral part of our analysis of cigarette use. In the present section we provide some general comments about the analysis strategy, and we also discuss a number of the specific choices which shaped the present analyses.

Emphasis on Descriptive Clarity

We have said that one of our purposes in this monograph is to report relationships in forms which are clear, provide useful descriptive detail, and are readily interpretable. It is important, of course, to ascertain statistical significance and to be able to express relationships in terms of explained variance; however, we think it is at least equally valuable to express relationships in terms of actual impacts on the dependent variables. Thus, for example, it is important to report (as we do in Chapter 4) that being pregnant has a statistically significant connection with reduced alcohol use; however, we think it is even more useful to report also that only about one quarter of the pregnant women in our samples (versus about three quarters of all other women) used any alcohol during the preceding 30 days (derived from Table 4.5), and only two percent of pregnant women (versus 27 percent of other women) used alcohol heavily during the preceding two weeks (from Table 4.6). Such reporting helps to provide clear indications of the impacts of the post-high school experiences we are examining; moreover, it permits useful comparisons across a variety of such experiences. For example, our reporting shows that the impacts on alcohol use are larger for pregnancy than for marriage, even though pregnancy accounts for less explained variance (because pregnancy affects fewer individuals at any single point in time).

One of our reasons for emphasizing descriptive clarity and detail is that the dataset available to us provides a wealth of such information, and we think this richness of data should be exploited. Given the large numbers of cases, we are able to focus on a variety subgroups; although some subgroups involve only small fractions of the total population, we still have enough cases to provide useful estimates. On the other hand, we must also acknowledge that the sheer amount of descriptive data, involving patterns of multiple transitions across up to five time intervals, threatens to be overwhelming. We have dealt with this problem by limiting our present focus to the impacts of post-high school roles and experiences, and by making a number of other specific choices about analysis methods, as outlined in the next sections.

Multiple Methods for Analyzing Panel Data

There are many ways in which panel data can be analyzed, even when we limit our focus to examining changes in drug use as related to post-high school roles and experiences. We have employed a variety of such methods in earlier analyses of Monitoring the Future data. Some analyses have examined the cross-time correlations for self-reported drug use and have decomposed these into estimates of stability and reliability (Bachman, Johnston, & O'Malley, 1981; O'Malley, Bachman, & Johnston, 1983). Other analyses have presented findings in the form of simple "before and after" mean scores for subgroups defined in terms of post-high school experiences, and also in the form of regression analyses in which the "before" (i.e., senior year) measure of drug use is included among the predictors of the "after" measure of drug use (Bachman et al., 1981, 1984). Still other analyses have used more complex causal models estimated using LISREL (Bachman, Schulenberg, O'Malley, & Johnston, 1990; Schulenberg, Bachman, O'Malley, & Johnston, under review).

Each of the methods noted above has advantages and disadvantages, and each has been useful in extending our understanding of changes in drug use during the post-high school years. We have used these multiple methods in part because our purposes have varied from one analysis to another. Structural equation modelling, for example, requires a more fully specified model of causal sequences than we were willing to impose in the present analyses; however, structural equation modelling was well suited for other analyses exploring more complex causal sequences (e.g., Schulenberg et al., under review). Another motivation for using multiple analysis methods is precisely because we do not consider any single approach to be free of risks and potential blind spots; we have greater confidence in our findings if they replicate across analysis methods. Fortunately, the findings from our various analyses of Monitoring the Future panel data have been largely consistent with each other, which we find most reassuring.

Specific Choices for Present Analyses

Our experiences in earlier analyses helped a great deal in our choices of methods for the present monograph; these choices were also shaped by a considerable amount of preliminary work, including much trial and error. The final choices reflect one set of compromises between detail and parsimony. In this monograph we have chosen to focus on only a portion of the factors influencing drug use during young adulthood; in other analyses building on the present findings, we will variously expand and contract our focus. In short, although our choices have compressed much information into this volume, there nevertheless remains much that we are not able to cover here.

The Use of Change Scores. In this monograph, the primary method for examining changes in drug use involves change scores. Each change score is calculated in a straightforward manner using self-reports of drug use obtained at two points in time ("before" and "after"). The earlier (or "before") measure of drug use (from the senior year survey) is subtracted from the later (or "after") measure of use (from a follow-up survey). Positive scores thus indicate an increase over time, and negative scores indicate a decrease. The response scales used for reporting each drug are spelled out in Chapters 3-6. Each of these scales is roughly logarithmic rather than reflecting equal intervals; accordingly, an increase of one scale unit generally indicates a doubling of use over time, whereas a one unit decrease generally indicates a reduction by about half. We consider such roughly logarithmic change scores derived from these scales to be quite useful, as the following may illustrate: We would judge a change in alcohol use from two drinks to four drinks per month as being a more substantial increase than a change from 22 to 24; the change is only two drinks in each case, but the proportional shifts are very different. The change score calculations used here do, in fact, treat an increase from 2 to 4 drinks (per month) as equivalent to an increase from 8 to 16, or an increase from 15 to 30; in each case the change score is +1 and reflects a doubling in rate of alcohol use.

There has been much discussion of the advantages and disadvantages of change scores in complex panel analyses. Our own views, along with a good deal of rather technical supporting argument, have been spelled out by Rodgers and Bachman (1988); for additional discussions see Cronbach and Furby (1969), Kessler and Greenberg (1981), Liker, Augustyniak, and Duncan (1985), and Rodgers (1989). At a general level we can say three things about our decision to employ change scores in this monograph: First, we have judged the advantages to far outweigh the disadvantages for our present purposes. Second, we have compared our current findings with prior findings based on somewhat different analysis methods (Bachman et al., 1984), and have found a high degree of consistency; specifically, our earlier results are closely replicated as a portion of the present far more extensive analyses. Third, an additional set of change or "transition" indicators has been included in our analysis, as noted below and spelled out beginning in Chapter 3; as the reader will see, the results are fully compatible with those based on change scores.

The Use of Transition Scores. One of the ways in which we have attempted to increase clarity and the descriptive value of our analyses has been to report changes in drug use in two different forms. As noted above, our primary form of reporting employs change scores which show *mean amounts* of change in drug use linked to specific post-high school roles and experiences. A secondary approach is to report *proportions* of the sample who undergo each of two transitions in drug use (i.e., from non-user to user, or user to non-user) as well as proportions who remain consistent users and proportions who remain consistent non-users. As we illustrate throughout Chapters 3-6, each of these two approaches has advantages. Moreover, although the addition of the transition scores somewhat expanded our analysis effort—and the resulting tables—we think the burdens on readers are minimal and fully offset by the additional information which these transition scores afford.

Some Advantages and Disadvantages of Change Measures Based on only Two Points in Time. Focusing on just two points in time has several advantages; it permits us to quantify changes in drug use in a straightforward fashion (i.e., "before and after" change scores), it permits us to characterize transitions in drug use using only four categories, and it permits us to characterize changes along other dimensions in a manageable fashion, as illustrated below. Each of these advantages is also a disadvantage, however, because experiences and behaviors in the real world are much more complicated than these simplified characterizations of change based on only two points in time. Consider, for example, the concept of "quitting" the use of a drug. Mark Twain said, "To cease smoking is the easiest thing I ever did: I ought to know because I've done it a thousand times." We suspect that many of the smokers in our panel analyses also have quit a number of times, only to return to the habit. Our measures at two points in time may happen to capture some instances of relatively short term "quitting" (or, for that matter, "initiation"); however, most such episodes are completely missed by "before and after" change scores measuring intervals which span at least one year and may span as many as ten.

"Before" Scores Based on Senior Year Surveys. It would be possible to treat any two adjacent follow-up surveys as the before and after measures for use in change scores. We have carried out some exploratory analyses using such scores, and we expect to conduct further analyses using such scores in order to focus closer attention on particular subsets of the post-high school experiences examined here. For present purposes, however, the use of a follow-up survey as the "before" measure would add a great deal of additional complexity. If we wish to look simultaneously at a number of post-high school experiences at the "after" point in our analysis, it is a great deal more manageable if the "before" point is less complicated—indeed, if we can treat all individuals as essentially similar in terms of the role dimensions of interest. High school seniors can all be treated as full-time (or nearly full-time) students, with very few also employed full-time. Nearly all are unmarried and living with one or two parents or guardians, and we have eliminated from the present analyses those few who do not fit that pattern. Thus, with respect to the main predictor variables of interest in the present analyses, we can treat the high school senior year as reflecting somewhat "equalized" conditions. This is, of course, a simplification, but one which greatly helps to make these analyses manageable. By thus streamlining the "before" point in our "before-after" analyses, we can deal with relatively high degree of complexity in post-high school experiences examined at the "after" point. This is so because each of the conditions in our "after" measures reflects not only the situation at that point in time, but also a change (or non-change) from the "before" conditions. For example, an individual living in a dormitory at the time of follow-up has also made a transition, whereas someone continuing to live with parents has not. (Chapter 3 includes a further discussion of the advantages of senior year "before" scores.)

"After" Scores Based on up to Five Follow-Ups. Most of the panel respondents examined here have participated in several follow-up surveys—many have completed five or more. Although some transitions (e.g., from single to married) typically occur only once in young adulthood, there are many exceptions; moreover, other transitions (e.g., changes in living arrangements or in student status) tend to occur several times and thus are less permanent. Therefore, it has seemed useful to consider each new follow-up survey completed by a panel respondent as providing a new set of findings, both in terms of drug use measures and also in terms of then-current post-high school role experiences and responsibilities. Consider, for example, a respondent from the senior class of 1978 who then participated in follow-up surveys in 1980, 1982, 1984, 1986, and 1988. At each of the five follow-up surveys this respondent may have been "new and different" in terms of one or more aspects of student status, employment status, marital status, living arrangements, pregnancy, and/or parenthood; the

respondent also may have been different in terms of cigarette use, alcohol use, marijuana use, and/or cocaine use. It follows, then, that each of these follow-up surveys, when coupled with the senior year survey, could provide a different set of drug use change scores, as well as a different set of predictor measures.

Combining Findings across Follow-Up Intervals. An extensive set of preliminary regression analyses enabled us to examine change scores separately using each of the first four follow-up surveys, and to compare findings across the four different intervals (ranging from one or two years to seven or eight years). These preliminary analyses taught us two important lessons. First, carrying out detailed regression analyses separately for the four follow-up intervals generated a nearly overwhelming amount of detail. Second, such detail proved to be unnecessary, because the general patterns of findings for the particular transitions under study in this monograph were quite similar across the four intervals—e.g., the impacts of marriage or pregnancy on drug use were largely the same whether measured at the first follow-up or the fourth.

Based on these preliminary findings, we decided to combine the findings across all five follow-up intervals, and do so in a fashion which gave each follow-up report equal weight. Thus, our relational analyses treat each follow-up survey as a separate observation. In order to illustrate age-related differences in the regression analyses, and control them as necessary, a set of dummy variables is included distinguishing among the first, second, third, fourth, and fifth follow-ups. We are thus able to observe both linear and non-linear patterns of age-related differences in change scores, and see how such patterns are changed once post-high school experiences are included in the regression equations.

Pooling Cohorts. Just as it would have been overwhelming to sort through complete regression data for five different intervals, so it would have been completely unwieldy to conduct analyses separately for the different cohorts of high school seniors. Moreover, to do so would have left us with too small numbers of cases and thus a high degree of unreliability in making comparisons across cohorts. Instead, we opted to pool results across all of the cohorts.

The use of change scores should do much to control for any stable differences from one cohort to another (i.e., cohort effects), but as an additional control our regression analyses include a linear term for year of initial (base year) survey.

Use of Multiple Regression. Given our purposes in this monograph, we chose multiple regression as our method for conducting and reporting multivariate relational analyses. We spell out the specifics of our regression rationale, format, and interpretations in Chapter 3, because such exposition is easier to understand in the context of actual findings. Here we summarize some of the considerations which led to our choice of this method.

One advantage which multiple regression shares with some other methods is the capability to use sets of dummy variables as needed (e.g., for categorical predictor variables), while also treating other variables as interval scales (i.e, focusing specifically on linear relationships).

Whereas a number of the background factors which are controlled in these analyses are appropriately treated as interval scales (e.g., grades), all of the measures of post-high school experience are treated as categorical variables.

In contrast to analyses employing LISREL to examine more complex causal models (e.g., Schulenberg at al., under review), the multiple regression analyses employed here are in some respects intentionally "agnostic" about causal order. In other words, although we prefer some causal interpretations over others (as we illustrate in subsequent chapters), we recognize that some alternate interpretations may be quite plausible; accordingly, we preferred to conduct the present analyses in such a way that the findings might be informative for various causal interpretations.

As discussed above, one of our key objectives in this monograph is to present findings in forms which are clear and readily interpretable. The regression analyses used here are designed to meet that criterion in two ways. First, the method itself is quite familiar and widely used. Second, the results can be formatted to show very clearly the *sizes of effects*, in addition to beta coefficients and explained variance.

Numbers of Cases Specified for Regression Analyses. The number of weighted follow-up observations that met our criteria for the present analyses was 57,069 (see Table 2.1). However, because most respondents provided multiple follow-up observations, the number of senior year cases (i.e., the actual number of different individuals who participated in these panels) is distinctly smaller—17,809 in terms of weighted cases. It is not obvious what value of N is most appropriate for use in the regression analyses. On the one hand, our primary focus is on the follow-up surveys, with senior year data treated largely as controls, so one might argue that 57,069 weighted follow-up observations would be reasonable. On the other hand, one could also argue that 17,809 is the appropriate value of N to use, because there are only about 17,809 fully independent sets of (weighted) base-year cases. We judged the best answer to lie somewhere in between, and chose what we considered the very conservative value of 20,000 to treat as the number of cases when computing significance levels and making adjustments in estimates of explained variance. Also conservative is our use of the .01 (two-tailed) criterion for statistical significance.

CHAPTER 2. SAMPLE CHARACTERISTICS—ROLES AND EXPERIENCES DURING THE FIRST DECADE AFTER HIGH SCHOOL

Dramatic role changes occur during the years after high school graduation. In all cases the role of high school student comes to an end, and is replaced by other roles such as college student, civilian employee, member of the armed forces, or various combinations of these and other roles. Changes in living arrangements occur for the large majority; they leave their parents' homes to begin married life, or to live in a dormitory or apartment while attending college, or to live with friends, or simply to be "on their own." Within the first few years after high school graduation substantial numbers have earned college degrees, and substantial numbers have also taken on the responsibilities of parenthood.

A central purpose of this volume is to examine the impacts of these roles and experiences upon drug use. We are interested in whether college attendance, military service, marriage, parenthood, and a number of other life events lead young adults to begin, increase, decrease, or end the use of various drugs. In other words, our primary focus is upon the more proximal, rather than distal, influences on drug use during young adulthood. Before we examine how these post-high school experiences relate to drug use, it will be useful to examine the experiences themselves, and how they are interrelated. Thus in this chapter we describe our samples of young adults, noting their patterns of role experiences at each of our follow-up survey points.

This description of post-high school role experiences may be of some value and interest in its own right, since it is based on fairly large-scale nationwide samples. It should be kept in mind, however, that the obtained sample is restricted in several respects, most notably by the fact that we sampled initially from high school seniors and thus do not include those who dropped out and did not return to complete twelfth grade, and also by the fact that for simplicity our present analyses omit the small proportions (about four percent) of the follow-up respondents who by the end of twelfth grade were already married and/or were not living with parents.

BACKGROUND CHARACTERISTICS

A variety of background characteristics are related both to drug use during high school and to early post-high school experiences such as college attendance, military service, marriage, and living arrangements. Accordingly, the analyses of drug use presented in subsequent chapters include statistical controls for some of the most important background factors. Table 2.1 describes our samples in terms of gender, race, region, and urbanicity (during senior year), parental education, senior year expectations for completing college, and high school grades.

Table 2.1 contains important information about the samples used in these analyses. Some of that information is fairly straightforward, and also largely redundant across columns (for reasons explained below). Other information is more subtle, indicating the nature of panel attrition and/or cohort differences. Unavoidably the table format is somewhat complex, and it requires a few words of introduction before we can summarize the findings contained in the table. To simplify this explanation, we focus on the first portion of the table, which contains data for males and females combined; the remainder of Table 2.1 presents the data in the same format for males and females separately[3]. Each of the columns in Table 2.1 presents background characteristics measured during the base year (i.e., twelfth grade) data collection. The first column shows the background characteristics for the *targeted* subsamples in the classes of 1976 through 1988—a total of 22,024 cases which were selected for follow-up and for inclusion in these analyses; the second column shows those characteristics for the 17,809 total which comprised the *obtained* first follow-up samples from those same classes (1976-88)[4]. The differences between the first and second columns indicate some of the ways in which the obtained samples differed from the targeted samples—differences entirely attributable to panel attrition between the base year surveys and the first follow-up surveys. The next four columns show the background characteristics of the obtained samples from the second through the fifth follow-ups. Note that the numbers of class years (i.e., cohorts) grow progressively smaller, reflecting the fact that with each increase in follow-up interval there were fewer classes available to provide data (as of the cut-off point chosen for these analyses). The numbers of cases also grow smaller, reflecting primarily the reduction in cohorts, plus some modest panel attrition beyond what had occurred at the time of the first follow-up. Thus, as one moves from left to right in the table, each column represents a subset of the column to its left (with the exception of the very small numbers of cases in each of the later follow-ups that had been "reclaimed" after missing one or more of the earlier follow-ups). It should be kept in mind that the data shown in all columns in Table 2.1 are drawn from the base year surveys, and the differences among columns thus reflect only differences in composition of the obtained follow-up samples selected for these analyses, *not* any changes in the individual respondents.

The seventh column in Table 2.1 provides totals across the previous five columns—i.e., the data for each of the five separate follow-up observations. These rather unusual tabulations have the effect of "counting" most members of the classes of 1976-1980 a total of five times (provided they participated in all five follow-ups), while counting members of the classes of 1987-1988 only once (assuming they did participate in the first follow-up—the only one to occur in time for use in these analyses).

As discussed in Chapter 1, our analysis strategy is to focus attention primarily on the follow-up findings, with the base year data acting as a kind of "control" or "before" measure. Thus, as noted above, follow-up participants from the classes of 1976 through 1980 provide five separate follow-up measures (except for attrition); it is important to keep in mind that each such follow-up has potentially different data not only on drug use, but also on the various living arrangements, as well as marital, educational, and occupational statuses. Extensive preliminary analyses examined each follow-up interval separately but revealed few important differences;

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[3] Subsequent tables in this chapter present data only separately by gender.

[4] All numbers of cases reflect the weighting described in Chapter 1.

accordingly, we chose to combine "cases" across all five follow-up intervals and conduct regression analyses with all such "cases"—actually observations—combined. One effect of that decision is that the earlier cohorts contribute more heavily to the regression analyses than do the later cohorts; another effect is that the first and second follow-up cases comprise larger proportions of the total than do the fourth and fifth. Among the important conclusions to be drawn from Table 2.1 is that, for the most part, these various subsets of respondents do not differ substantially in terms of background characteristics.

Gender and Race Differences in Survey Participation

The numbers of cases in the second portion of Table 2.1 show that females slightly outnumbered males in the initial base-year sample selected for follow-up study (target Ns of 11,391 and 10,632, or 51.7 percent and 48.3 percent, respectively), and then this disparity increased by several percentage points (to 54.6 and 45.4 percent) in the first follow-up sample (with little further change in later follow-up samples).

The initial sample of males contained about 79 percent whites and 11 percent blacks, with the remaining 10 percent spread across several other categories too small for separate analysis; for females the percentages were 77, 13, and 10, respectively. As can be seen in Table 2.1, the effects of panel attrition are greater than average among blacks and among those in the "all other" category; these effects grow larger across successive intervals.

Geographical Differences in Participation

Regional distributions are affected only minimally by panel attrition. The slight declines in proportions from the South and West seem largely attributable to the larger proportions of non-whites from those regions. Panel losses were below average among those who (as seniors) lived in the country, and especially among the relatively small proportion who lived on farms. (This may in part reflect greater success in reaching these respondents by mail some years after graduation.)

Participation Linked to Educational Success in High School

Turning to factors relating to educational abilities and aspirations, we see that the mean high school grades for the obtained follow-up samples are slightly higher than for the target sample; not surprisingly, those who had poorer grades in high school were a bit less likely to participate in the follow-up surveys. As can be seen in Table 2.1, the different follow-up intervals, with their different class compositions and slight differences in panel attrition, were virtually identical in senior year grades. It thus appears that some who were more marginal students during high school were more likely to be lost in the first follow-up, but once beyond this point there was little further panel loss linked to high school educational success. (We note in passing that the male-female difference in average grades, which is generally observed during high school, is also evident in Table 2.1.)

Given that those with better high school grades were somewhat more likely to participate in the follow-ups, it is not surprising that Table 2.1 also shows that differences in participation are linked to college plans. The first follow-up shows a slightly higher rate of participation among those who "definitely" expected to complete college; however, the percentages then shift in the other direction for the longer follow-up intervals. The explanation for the latter shift lies in the restricted set of cohorts (graduating classes) available for the longer follow-ups, coupled with the fact that there was a moderately rising secular trend during the 1980s in proportions of seniors expecting to complete college. In other words, the senior classes of 1976 through 1980, which were the only ones participating long enough to contribute to the fifth follow-up data used here, had lower average college expectations than did subsequent classes.

A similar observation can be made regarding the slight differences among follow-up samples in terms of parental education. As expected, parental educational levels were slightly higher for the obtained versus the target sample for the first follow-up. The same is true for the other follow-ups (target data not shown); however, the fact that the parents of earlier graduating classes averaged slightly lower in education compared with those of later classes accounts for the slight shift in means shown in the table. We found that parental education contributed virtually nothing in preliminary multiple regression analyses, above and beyond the contributions of high school grades and college plans; accordingly, parental education was not included in the final regression analyses reported in Chapters 3 through 6.

Representativeness of Obtained Samples

In sum, the obtained samples at each follow-up interval are generally quite similar to the target samples (and thus similar to the much larger high school senior samples from which they were randomly subsampled). The most important exceptions are shifts brought about by lower than average participation rates on the part of males in general, and by blacks and other minorities (both male and female).

STUDENT STATUS AND EDUCATIONAL ATTAINMENTS

Table 2.2 shows that just over half of all respondents in the first follow-up, and well over a third of those in the second, had been full-time students during March of the year in which they were surveyed. By the third and fourth follow-ups the proportions were much lower, and a gender difference had emerged. Higher proportions of males remained in school longer as full-time students, and higher proportions eventually obtained a bachelor's degree. The proportions of both males and females who were part-time students rose slightly during the first years after high school, and then remained at about 10 percent during the fifth through tenth years after high school (i.e., third through fifth follow-ups).

WORK STATUS AND EXPERIENCES

Not surprisingly, as the proportions of full-time students decreased with each year beyond high school, the proportions in full-time civilian employment increased (see Table 2.2). Rates of full-time military employment, on the other hand, peaked early at six percent among males and slightly under one percent for females. (Although military service involves only a small number of cases in our samples, we shall see that it is a very interesting category of experience as related to drug use.) Part-time employment drops off sharply in the later follow-up samples, corresponding to the decline in numbers of students. The numbers of full-time homemakers rise to one in eight females by nine or ten years beyond high school.

Unemployment turned out to be a difficult concept to operationalize with the available follow-up questionnaire data. One indicator of unemployment is to some extent matched with our measures of employment and student status as of March (generally one to three months prior to the time when the survey is completed). At each follow-up point between four and six percent of all respondents, both male and female, were neither employed nor students, and thus can be viewed as unemployed (the "not employed & not a student" category in Table 2.2).

Another indicator of unemployment, which is not closely tied to a specific time period, is a question asking how many weeks during the previous calendar year the respondent was unemployed and looking for work. As can be seen in Table 2.2, that figure declined from about five weeks during the first year or two beyond high school to only about two weeks during the ninth or tenth year after graduation.

Table 2.2 also shows dramatic shifts in mean annual earnings with increasing years beyond high school, a change which is heavily influenced by the increasing proportions moving from predominantly student roles to roles as full-time employees. (Note that all respondents are included in the calculation of the mean, whether or not they are employed.) Substantial gender differences in earnings are in evidence, attributable only partly to the facts that some women are full-time homemakers and that part-time employment is more frequent among females. Status rankings of the jobs held by respondents also rise substantially during these first years after high school, and show a pattern of increasingly large gender differences.

(We should note that preliminary analyses using the above measures of weeks of unemployment, annual income, and job status all showed very small relationships with changes in drug use; accordingly, these predictors were not included in the multiple regression analyses reported in Chapters 3-6.)

LIVING ARRANGEMENTS AND MARITAL STATUS

Individuals' living arrangements usually are strongly interrelated with day-to-day interpersonal contacts, and it is that aspect of living arrangements which is of particular interest for our present purposes. Taking that perspective, and consistent with our earlier analyses

(Bachman et al., 1984), we have found it useful to combine marital status and living arrangements, setting up a single non-overlapping scale. Each respondent is placed in the *first* applicable category, ordered in terms of importance as follows:

1. Married
2. Living with a partner of the opposite sex
3. Living with parents
4. Living in a dormitory
5. Living alone
6. All other living arrangements

(Those who described themselves as married at the time of the follow-up survey were assigned to the first category; the remaining assignments were based on responses to the question "With whom did you live during March?")

A few words are in order about the conceptual bases for the above ordering of living arrangements. We believe that, for young adults in general, a fundamental and pervasive factor influencing interpersonal relationships and many other aspects of living arrangements is whether or not they are married. Thus we place "married" as the first alternative in our ordered set of living arrangements. We could have treated marriage as a separate dimension, of course, but early analyses attempting to do so consistently ran into difficulties trying to sort out the complex interconnections and interactions with other aspects of living arrangements. Instead, our strategy of treating marriage as one category of living arrangement permits us to distinguish a number of other living arrangements, yet when it is preferable to do so we are also able to contrast the "marrieds" with all "singles" (i.e., ignoring distinctions among other living arrangements). Another point worth noting is that, in fact, the other living arrangements we distinguish are largely non-overlapping with being married, and any exceptions (e.g., young marrieds living with parents) would in most cases still be qualitatively different from those who were unmarried.

One important limitation to this approach is worth noting. The question about marital status includes four response categories, presented in the following order: Married, Engaged, Separated/Divorced, Single. (Although engaged and divorced individuals are also single, our purpose in presenting the four categories in that order was to encourage engaged or divorced individuals to so identify themselves.) For purposes of the present categorization of living arrangements, of course, all three non-married conditions (including separated) are treated together. In earlier analyses, however, we found that being engaged seems to contribute to reductions in drug use, and thus represents an aspect of lifestyle (if not necessarily living arrangements) which is worthy of exploration (Bachman, 1987). (The bottom row in Table 2.2 shows the proportions of respondents at each follow-up who identified themselves as engaged; although we opted not to complicate our main regression analyses by including the engagement dimension, we do expect to examine it in other analyses.)

Living with a partner of the opposite sex has some obvious parallels to being married, as well as some important differences (on average) in terms of strength and probable length of commitment. Some instances of cohabitation may be quite similar to marriage, and may indeed be a prelude to marriage; others represent more tenuous arrangements. In any case, we viewed cohabitation as clearly second to marriage in its potential for influencing a wide range of interpersonal relationships and lifestyle.

Table 2.2 shows how males and females in each of the obtained follow-up samples are classified according to marital status and other living arrangements. The proportions of males married rise sharply from 4 percent one or two years after high school to 52 percent by nine or ten years after high school; the proportions of females married are consistently higher, rising from 10 percent to 60 percent. The percent cohabiting with a partner of the opposite sex rises to about 7 percent for males and about 8 percent for females.[5]

Many high school graduates continue to live with their parents, at least for a few years. Table 2.2 shows that half of those in our sample were doing so one or two years after graduation. By nine or ten years after high school, about one in eight males and one in nine females were living with one or both parents (and unmarried); put differently, about one quarter of all the unmarrieds were still living with their parents by about age 27-28.

For many young adults college attendance provides the occasion for leaving the parental home. During the first year or two after high school, about 22 percent (or about 40 percent of all full-time students) lived in dormitories. The figure dropped to 10 percent (about 25 percent of full-time students) during the third or fourth year after high school. Very few recent high school graduates reported living alone, a figure which gradually rose to about 14 percent of males and 10 percent of females by ten years after high school (see Table 2.2).

The category "all other living arrangements" consists largely of those sharing apartments or houses with others. Table 2.2 shows that in the third and fourth years beyond high school about one in four males and one in five females were in such other living arrangements. (For some college students, these kinds of housing were alternatives to dormitories; later we take a more detailed look at how living arrangements differed between college students and non-students.)

PREGNANCY AND PARENTHOOD

Very few respondents reported being parents as of the first or second year after high school, but with each succeeding follow-up the proportion of parents rose (as shown in Table 2.2). By nine or ten years after high school, more than one third of the males and nearly half of the females were parents. Most of these parents were also married, especially by the fifth follow-up; however, substantial proportions of those who were parents within a few years after high school did not report being married at the time of the follow-up surveys. (Because both marriage and parenthood can have impacts on changes in drug use, and because these two roles overlap in a complex fashion, we considered it important to maintain the distinction between married and unmarried parents in our analyses rather than allow the two factors to be confounded in ways that we could not detect.)

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[5] We recognize that we have omitted cohabitation with partners of the same sex; however, we felt that making distinctions between same-sexed lovers and those who were simply roommates or housemates would have required more extensive and complex items than we were willing to include in the questionnaires.

The questions on pregnancy were not included in the earliest follow-up surveys, so the estimates for this variable are based on fewer cases (and later cohorts—specifically follow-up data obtained in 1984 and thereafter). About 3 percent of the female respondents in the first year or two after high school reported being pregnant, and this proportion rose gradually to about 7 percent for females seven to ten years after high school. Among males, the proportions reporting a pregnant spouse were slightly lower (although by nine or ten years after high school the rates for males had just about caught up with those for females). The somewhat later ages of marriage for males explain much of the gender difference here, but an additional factor is that the question for males referred to a pregnant *spouse*, whereas for females the question did not require that they be married.[6]

INTERRELATIONSHIPS AMONG EDUCATION, EMPLOYMENT, AND LIVING ARRANGEMENTS

The roles and experiences outlined in the preceding sections are, of course, interconnected and interrelated in many complex ways. We have already discussed our decision to combine marriage with living arrangements as a single dimension. Another obvious relationship is the trade-off between student roles and employment roles; very few individuals are simultaneously full-time students and full-time employees, simply because the two roles compete for finite amounts of time and energy.

In this section we document interrelationships among three key dimensions of role responsibilities and experiences: student status, employment status, and living arrangements. Tables 2.3-2.5 present bivariate frequency distributions relating student status with employment status (Table 2.3), student status with living arrangements (Table 2.4), and employment status with living arrangements (Table 2.5). These tables provide data separately for each of the five follow-up points; for each follow-up sample the tables show the percentages of the total falling into each combination of role experiences.

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[6] The questionnaire item was worded as follows: "Are you (or is your spouse) currently pregnant? Yes, definitely; Probably; No" (with the "definitely" response scored as a pregnancy). We could have attempted to expand the question so as to encompass current pregnancies among non-spouses for which males considered themselves responsible; however, we felt the result would have been an awkward question that would risk confusing some respondents, and annoying or offending others, while generating data of questionable value. We chose instead to live with an additional degree of asymmetry between the males and females with respect to pregnancy.

Calculations based on Table 2.3 reveal that during the first year or two after high school, only about nine percent of male full-time students, and even fewer females, were also employed full-time. On the other hand, substantial proportions of full-time students (about 40 percent) were employed part-time. Turning now to the part-time students, half or more were employed full-time and most of the rest were employed part-time. (It may be helpful to illustrate how such percentages are derived from Table 2.3. Note that the right-hand column shows that 52.7 percent of all males in the first follow-up were full-time students; the left-hand column shows that 4.8 percent of all first follow-up males were both full-time students and employed full-time; 4.8 is approximately nine percent of 52.7.) Although the overall proportions of students decline sharply as we move beyond the first two follow-ups, Table 2.3 indicates that the general relationships described above hold true across all five time periods (i.e., from one through ten years beyond high school).

Among non-students, full-time employment was clearly the norm. Among females, however, the role of full-time homemaker was reported by substantial subsets of the non-students, especially in the later follow-ups. Also among female non-students there were significant subsets in part-time jobs, and of course many of these were homemakers as well.

Table 2.4 displays how student status is interrelated with living arrangements. Most important, perhaps, is the fact that very few full-time students were married, especially during the first four years after high school. Also important is the fact that full-time students are more likely than other recent high school graduates to leave their parents' homes. During the first year or two after high school, a bit more than 40 percent of the full-time students continued to live with parents, in contrast with about 70 percent of part-time students and about 60 percent of non-students. Many of the full-time students lived in dormitories—about 40 percent in the first one or two years after high school and about 25 percent in the third or fourth year. The "other living arrangements" category grew in popularity among students in their third and fourth years beyond high school; we presume that in most cases this was rental space shared with students or other young adults. Very few students reported living alone.

Table 2.5 shows interrelationships between employment status and living arrangements. We note first that the "other" category in this table consists very largely of non-employed full-time students, and it shows again the low proportions married and the high proportions living in dormitories and other arrangements. An additional bit of information that can be gleaned from this table and earlier ones is that the majority of college students who did not hold part-time jobs lived in dormitories during the first two years after high school. Looked at the other way, virtually all dormitory residents were full-time students (Table 2.4), the majority of whom did not hold jobs, especially during their first two years as students (Table 2.5).

The remaining relationships in Table 2.5 are rather straightforward. Nearly all full-time homemakers were married. Those in full-time military service were a bit more likely to be married than their counterparts in full-time civilian employment; most other military personnel lived alone or in "other" living arrangements, not with their parents.

SUMMARY

We can now summarize some key findings in this section and at the same time look ahead to the next chapters. Among the most fundamental choices facing students who leave high school is whether or not to commit the next several years to college. More than half of the high school graduates during the first year or two after high school did become full-time students in college (or other post-high school education). Compared with their high school classmates, these college students were less likely to marry, more likely to leave the parental home, and thus more likely to live in housing (dormitories and student rentals) with large numbers of age-mates and relatively few children or older adults. Furthermore, many full-time college students (especially those living in dorms) were non-employed, and most of the rest were employed only part-time, thus leaving them with relatively flexible schedules. As we shall see in the following chapters, these differences in living arrangements and role-relevant responsibilities have important implications for drug use during young adulthood.

In reviewing this chapter we note also that the proportions of young adults in various roles and living arrangements shifted substantially from one follow-up to another. In an extensive set of preliminary regression analyses, of the general type reported in Chapters 3 through 6, we examined each of the first four follow-ups separately. One important general conclusion from those analyses was that even though the proportions were different from one follow-up to another, the impacts of various post-high school experiences on drug use seemed much the same whether examined in the first two years after high school, or the seventh and eighth years. We thus concluded that, for the sake of simplicity and clarity, and to gain the advantages of larger numbers of cases for analysis, we would carry out our regression analyses with the several follow-up periods combined. But based on the findings in this chapter we can keep in mind some important distinctions, such as the fact that most of the full-time student cases occur in the first or second follow-up, whereas most instances of marriage and parenthood involve the later follow-ups, when the respondents were in their middle and late twenties.

CHAPTER 3. CHANGES IN CIGARETTE USE

Earlier analyses of drug use among young adults led us to conclude that cigarette use is the most distinctive of the drug use behaviors in several respects. It is by far the most widespread addictive behavior among young people, which helps to explain some of our longitudinal findings. Two key longitudinal findings were that cigarette use is much more stable than other drug use behaviors, and it seems relatively unaffected by differential post-high school experiences (Bachman et al., 1984).

Post-high school cigarette use is highly predictable from senior-year smoking patterns. After adjusting for measurement reliability, we estimate annual stability to be about .89 during the first year after high school and even higher (about .94) during subsequent years (derived from O'Malley, Bachman, & Johnston, 1983; also Bachman et al., 1984). These high stability coefficients mean that individuals who smoke during high school are very likely to continue smoking after high school, and that non-smokers are likely to continue as non-smokers. But high stability does not necessarily mean that the average quantity of cigarettes used remains unchanged; on the contrary, we found that the number of cigarettes smoked tends to increase during the first few years after high school.

Why do rates of smoking increase after young people leave high school? One fairly obvious explanation is that the typical high school setting constrains young people from smoking, whereas in practically all post-high school educational and occupational settings it is more feasible and acceptable to take an occasional cigarette break. (The increasing number of smoke-free work settings may be reducing this distinction somewhat; nevertheless, it remains the case that it is against the rules in virtually all high schools for students to step out of the building for a smoke, while that is rarely the case in post-high school work and educational settings.) It thus seems to us that the reduction or removal of situational constraints may be largely responsible for the average increase in numbers of cigarettes consumed by young smokers after they finish high school. One implication of this line of thinking is that many smokers during their high school years would have consumed cigarettes at higher daily rates, had they been free to do so. A further implication is that if the trend toward smoke-free work places continues, the progression to higher levels of consumption after high school may be reduced at least to some extent.

Although leaving the high school environment seems to reduce constraints on smoking, our earlier analyses did not provide any clear indication that some post-high school environments are more likely than others to cause a rise in smoking rates. We did find substantial differences in rates of smoking between those who went to college and those who did not, but those patterns were firmly established before the end of high school. We thus concluded that the different rates of smoking did not result from post-high school educational experiences. We do, however, strongly suspect that *earlier* educational failures may play an important role in the initiation into smoking (see Bachman et al., 1990; Schulenberg et al., under review, for further discussion and supporting data).

Our prior findings of high stability and lack of differential change are fully consistent with the growing tendency to view cigarette use as addictive behavior. Based on such findings, we had little reason to expect that further exploration would reveal important shifts linked to post-high school experiences. In fact, however, while the present analyses do replicate our findings that cigarette use is highly stable, we will also report new evidence that certain post-high school roles and experiences do contribute to changes in smoking.

We begin this chapter with a fairly detailed look at how cigarette smoking changes during the first decade after high school. Then we examine how such changes are linked to key roles and experiences during that period.

PATTERNS OF CHANGE IN CIGARETTE USE

We have analyzed and described elsewhere the overall shifts in cigarette use linked to age, historical period (secular trends), and cohort differences (O'Malley, Bachman, & Johnston, 1984, 1988a, 1988b). In addition to the age-linked rise in cigarette consumption associated with leaving high school, we found stable cohort differences: smoking rates among high school seniors reached their peak levels with the graduating classes of 1976 and 1977, and for the next several years each succeeding class had a smaller proportion of regular smokers—both as seniors and during the early years after high school. At a time when cigarette use was increasingly disapproved and discouraged, slightly fewer high school students each year were recruited into the ranks of smokers; but once begun the behavior is so stable that the differences between graduating classes remain evident years later. (The downward trend continued through the class of 1981; thereafter the rates of smoking have declined very little from one class to another.) The cohort differences in smoking are of considerable interest, particularly since they provide further evidence of the addictive nature of cigarette use. However, they are not a primary focus of our present analysis effort.

In this report we focus on change at a more detailed level, and concentrate on possible differential effects of post-high school experiences. Since some of these experiences are relatively infrequent, and thus affect only a few cases from any one senior class follow-up sample, we have found it helpful to combine data across all available cohorts. (The cohort differences noted above add some slight complications to these combined analyses, as we shall see; however, the problems are not severe, and the gains in accuracy and simplicity of presentation more than offset the difficulties.)

Table 3.1 displays patterns of change, based on rates of cigarette use during the past 30 days, for the five intervals included in this analysis. Part A of Table 3.1 displays means of change scores for 30-day cigarette use; these are shown separately for each of the five intervals, and for males and females as well as for the total sample. Also shown in the table are the base-year scores and follow-up scores (and it can be seen for each interval that the mean of change scores is equivalent to the difference between the base-year and follow-up means). The scale of monthly use, on which these scores are based, consists of the following categories:

1 = Not at all
2 = Less than one cigarette per day
3 = One to five cigarettes per day
4 = About one-half pack per day
5 = About one pack per day
6 = About one and one-half packs per day
7 = Two or more packs per day

A comparison of mean change scores across the five intervals reveals the age-linked rise in cigarette consumption described above; at one or two years after high school there were mean upward shifts of .16 for males and .12 for females; by three or four years the mean increases above senior year levels were .25 for males and .17 for females; but there were little or no further mean increases revealed in later follow-ups. In fact, by the time of the fourth follow-up there were slight "downturns" compared with the changes at the third follow-up, and at the fifth follow-up the downturn was larger, especially among the females. No such decline in smoking would be predicted from our earlier research (based on shorter follow-up intervals): however, it is fully consistent with our new findings presented below.[7]

Transitions in Daily Smoking

The mean change scores in Part A of Table 3.1 leave some important questions unanswered, which we address as we examine the remainder of Table 3.1. We were interested in being able to describe individuals in somewhat clearer terms, for example, whether or not they were daily smokers; having done that, we could also distinguish between those who had initiated such daily smoking after high school, those who had dropped the daily smoking habit, etc. We thus found it useful to classify respondents according to whether they smoked one or more cigarettes per day during the 30 days preceding each survey (response codes 3-7 above), and Part B of Table 3.1 displays the four possible combinations: those who were daily smokers at the time of both base-year and follow-up surveys, those who went from non-smokers (or less than daily smokers) as seniors to smokers at the follow-up, those who made the reverse transition, and those who did not smoke on a daily basis at either time. Also displayed for each of these groups are the mean scores (on the 7-point smoking scale described above) at both senior year and follow-up.

Those who did not smoke on a daily basis either as seniors or at the follow-up represent by far the largest portion (more than two-thirds) of all cases. It is important also to recognize that the large majority of those who were not daily smokers actually reported no smoking at all during either period (and since such individuals have change scores of zero, it follows that all of the changes shown in Part A of Table 3.1 were produced by much fewer than half of all respondents). The very low overall rate of smoking among these individuals is revealed by their mean base-year scores of approximately 1.1. Keeping in mind that the zero point on that scale was coded as 1, the 1.1 mean score indicates that about 90 percent of these non-daily smokers reported no smoking at all during the past month, while 10 percent reported infrequent smoking (less than one cigarette per day). At the time of the first follow-up the balance remained essentially the same between non-smokers and infrequent smokers, but by the time of the fifth follow-up the initially small proportion of infrequent smokers was cut in half.

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[7] The mean scores for base-year and for follow-up reveal an underlying complexity in the "downturn" noted above. The *follow-up* mean scores are nearly the same for the second, third, fourth, and fifth follow-up intervals; however, the corresponding *base-year* mean scores show small but systematic differences. These differences reflect the shifting composition of the base-year samples; specifically, our analysis of the fifth follow-up was necessarily limited to the classes of 1976-80, whereas for the first follow-up we were able to include the classes of 1976-88 (see the "Class Years Included" row at the top of Table 3.1). As we noted earlier, smaller proportions of seniors in later cohorts were smokers, and the shorter follow-up intervals include these later cohorts whereas the longer intervals do not.

The next largest portion of all cases (about 16 percent) consists of those who smoked on a daily basis at both base-year and follow-up. Their smoking behavior was not as stable over time as that of the consistent non-smokers, since many of them changed the amount of cigarettes they consumed. Most such changes after high school were in an upward direction, as can be seen by comparing the mean base-year and follow-up scores; the mean shift was a positive 0.3 or 0.4 (on the 7-point scale) for the first year or two after high school, and it gradually increased to 0.6 to 0.7 by the ninth or tenth year after high school. To put it another way, as high school seniors these individuals were averaging a little more than a half pack per day, whereas by their middle to late twenties the males were averaging a pack per day and the females were averaging slightly less.

Smaller numbers of young adults first enter the ranks of daily smokers at some point after leaving high school. During the periods encompassed by this analysis, about seven percent did so within a year or two after graduation, and in later years the rate rose to nine or ten percent. An examination of the base-year means reveals that a substantial minority (about one-third overall) of these "late recruits" into daily smoking were already smokers during their senior year, but on less than a daily basis. At the time of the follow-up, the "late recruits" had not fully caught up with those who already had become daily smokers as seniors, although the gap was closing; by the fourth and fifth follow-ups the "late recruits" were averaging between a half and a whole pack daily, with amounts again slightly higher among males.

The smallest change category, but in many ways the most interesting, consists of those who ceased daily smoking sometime after high school. This group is interesting because most of them quit smoking entirely—a task which many people find very difficult. The group is interesting also because in our earlier analyses we were unable to isolate any aspect of post-high school experience or environment which clearly contributed to quitting. It is noteworthy that while only three percent of males and four percent of females ceased daily smoking by the time of the first follow-up (one or two years after high school), the percentage increased with each time interval so that by the fifth follow-up six percent of the males and nine percent of the females sample had stopped daily smoking. These figures are more impressive when expressed as proportions of those who were daily smokers as seniors; 19 percent of such daily smokers (both male and female) had ceased as of their first follow-up, and by the fifth follow-up the proportions had risen to 29 percent of the males and 37 percent of the females. (It should be kept in mind, of course, that some of those who quit the ranks of daily smokers for some time interval return to smoking, so quitting should not be viewed as necessarily permanent; nevertheless, smoking behavior is so highly stable that it seems clear that many of the early quitters remained non-smokers, and the table indicates that they were joined by others during succeeding years.)

Although those who ceased daily smoking are a very small proportion of the *total* sample, they represent a somewhat more substantial proportion of those 21 percent who were daily smokers as seniors (derived from the total sample data in the last column of Table 3.1, by combining the second and fourth categories in Part B). Looking more specifically at males who smoked daily as seniors we can see that 19 percent (3.3 divided by 17.3) of them did not do so at the time of the first follow-up, whereas by the time of the fifth follow-up the comparable figure is 29 percent (6.2 divided by 21.1). Among females who smoked daily as seniors, 19 percent (4.2 divided by 21.8) did not do so at the first follow-up, contrasted with fully 37 percent (9.5 divided by 25.6) at the fifth follow-up. These increased proportions of quitters were responsible for much of the slight "downturn" in average cigarette consumption by seven through ten years beyond high school (as indicated by the smaller mean changes for the fourth and fifth follow-ups, compared with the third, see Part A of Table 3.1).

Continuing our focus on those who were daily smokers during their senior year, we turn now to an examination of their mean scores. Those who would later quit (fourth category in Part B) averaged somewhat less than half a pack per day as seniors (about 3.7; 4 = about a half pack per day), whereas those who would continue as daily smokers (second category in Part B) averaged a bit more than a half pack per day while still seniors (about 4.2). Looking more closely those who quit daily smoking, the follow-up mean scores reveal some interesting differences related to length of time after graduation. Among the "quitters" at one or two years post-high school, fully a third still smoked, but on a less than daily basis; however, that proportion is lower for each longer interval, so that by nine or ten years after graduation only half as many (13 percent of males, 17 percent of females) reported any use of cigarettes during the past month. (Of course, some of those shown as quitters by the third or fourth follow-up had quit daily smoking as early as the first or second follow-up—and part of what is shown in the table may reflect such individuals reducing first to less than daily smoking and later to no smoking at all.)

Transitions in Half-Pack-a-Day Smoking

The preceding section distinguished between daily smokers and those who smoked less than daily or not at all. Another useful distinction lies one step further up the seven-point scale of smoking, between those who smoked at least a half pack of cigarettes per day and those who did not. The differences between these two cutting points can be seen in considerable detail by comparing Parts B and C in Table 3.1, and we will also report here a few relationships which are not included in the table. First, we should note that about two-thirds of all those who smoked daily at both base-year and follow-up were consuming at least a half pack per day on both occasions (i.e., 10.4 percent is two-thirds of 15.9 percent). And, of course, the overall mean rates of cigarette use were higher for this two-thirds.

Second, we can see that when we set the threshold at the half-pack level, about three-quarters or more respondents were below it at both base-year and follow-up (about five to nine percent more at each interval than were below the daily smoking threshold).

Third, we can see that the proportions of the total sample moving above the half-pack-a-day threshold after high school are roughly the same as those moving above the daily smoking threshold. Indeed, there is a good deal of overlap between these two transition groups, since some individuals go from less than daily smoking as seniors to smoking a half pack or more as graduates. Specifically, among those who crossed the daily smoking threshold within one or two years after graduation, about half were smoking a half pack or more per day; and the proportion gradually increases with longer intervals so that among those who had become daily smokers by the time of the fourth follow-up, one quarter were smoking a half-pack daily and about half were smoking a full pack or more per day (these data are not included in Table 3.1). These observations are fully consistent with our more general finding that the amount of cigarettes smoked increases during the first few years after high school.

Fourth, when we turn to those individuals who reduced or quit smoking after high school, we see that a smaller number of individuals dropped below the half-pack threshold than dropped below the daily threshold of smoking as seniors. But this is hardly surprising, since there had been fewer seniors smoking at or above the half-pack level. Indeed, we noted earlier that 19 percent of those who smoked daily as seniors had stopped doing so by the time of the first follow-up, and a parallel analysis based on Part C of Table 3.1 shows that comparable percentages of the half-pack or more senior smokers had dropped below that level by the first follow-up—19 percent of the males (2.3 divided by 12.0) and 21 percent of the females (2.8 divided by 13.4). Moreover, nearly half of these individuals seemed to have quit completely—they reported no smoking at all during the preceding 30 days. By the fifth follow-up 29 percent of male daily smokers had reduced or stopped smoking, and the figure for half-pack-a-day smokers is a very similar 27 percent (4.2 divided by 15.5); among females 37 percent had stopped daily smoking, and 36 percent (5.7 divided by 15.8) had stopped half-pack smoking. It thus appears that those who smoked a half-pack or more as seniors were just about as likely to cut down (though not as likely to quit entirely) as those who smoked only a few cigarettes per day during their senior year.

In this chapter we have chosen to examine mean changes in cigarette use plus two sets of change patterns, one distinguishing daily smokers from those who smoke infrequently or (in most cases) not at all, and the other distinguishing half-pack-a-day smokers from those who smoke less or not at all. We could have chosen other or additional ways of dichotomizing our measure of smoking during the past 30 days, or we could have expanded our measurement beyond dichotomies. Also, we could have explored more complex patterns of change involving multiple follow-up measurements. Indeed, some such analyses were carried out in order to estimate stability of drug use and reliability of measures (O'Malley et al., 1983; Bachman et al., 1984). However, the simpler patterns of change presented above seem best suited to our primary focus on how post-high school experiences are linked to changes in drug use.

Gender Differences in Cigarette Use and Changes in Use

Before reporting our analyses linking post-high school experiences to changes in cigarette use, it will be useful to highlight the extent and nature of male-female differences in smoking, and especially different patterns of *changes* in smoking. On the whole, the gender differences are not especially large, certainly not compared with the differences we will see in later chapters for other drugs. Still, we have already noted gender differences in quitting rates, and such differences relate quite directly to the change analyses which follow.

Looking first at base-year mean scores (Part A of Table 3.1), we can see that senior-year cigarette use (base-year mean) was somewhat higher among females than among males. The gender difference in means was a bit smaller at the first follow-up, and by the later follow-ups (i.e., when they had reached their mid-twenties) the gender difference had slightly reversed. These different patterns for base-year and follow-up means are, of course, reflected also in change scores; the increases in smoking were greater for males than for females, on average, especially over the longer time intervals, and the quitting rates were higher for females.

Turning to the change patterns, we see that there were about two to four percent more males than females for each interval who consistently did not smoke daily (the "No-No" row in Part B of Table 3.1). Moving to the half-pack-a-day threshold (Part C), we see that nearly identical proportions of males and females remained below that level at both senior year and follow-up.

We see no important gender differences in proportions who "initiated"—i.e., whose smoking increased enough to cross either the daily smoking or the half-pack threshold. Their base-year means are also nearly identical, but follow-up means reveal that the males increased their cigarette consumption by slightly greater amounts, on average, than did the females.

The most important and interesting gender differences appear when we look at those who quit or reduced their smoking (the "Yes-No" rows in Table 3.1); at both the daily smoking and half-pack-a-day thresholds, and at all four follow-up points, the females outnumbered the males. We carried out some additional analyses of those who had been half-pack or more smokers as seniors, in order to distinguish between those who had (at least for the month preceding the follow-up) quit completely, and those who had reduced their consumption to only a few cigarettes a day or even less. The results are displayed in Table 3.2. The findings in italics show that among all those who were half-pack or more smokers as seniors, about four-fifths of both males and females were still smoking at or above the half-pack level at the time of the *first* follow-up; however, the proportions gradually declined over longer time intervals, and by the time of the fifth follow-up fewer than three-fourths of the males and fewer than two-thirds of the females continued to smoke at that level. Among those who no longer smoked at or above the half-pack level, about half of the males at the first follow-up, and slightly fewer of the females, had stopped smoking entirely (i.e., reported no use of cigarettes during the previous month); and by the fifth follow-up the "quitters" outnumbered the "reducers" by more than two-to-one.

On the whole, rates of smoking, and patterns of changes in smoking, show more similarities than differences between males and females. Still, we do see slightly more females than males reducing their smoking, and quitting outright; later in this chapter we will see that some post-high school experiences are particularly likely to lead females to cut down on cigarette consumption.

INTERLUDE I: RATIONALE AND FORMAT FOR REGRESSION ANALYSES IN THIS AND SUBSEQUENT CHAPTERS

In Chapter 1 we noted our preference for multiple regression analysis as a method for dealing simultaneously with a complex array of factors which might be related to drug use among young adults, and in Chapter 2 we introduced each of these factors and showed some of the ways in which they are interrelated. In the remainder of this chapter we explore how these various factors are related to, and may be causes of, cigarette smoking, and changes in smoking, during the post-high school years. We are also particularly interested in how these factors may overlap in their relationships with smoking, and in how such overlaps should be interpreted.

Multiple regression is designed to focus on one "dependent variable" at a time, and examine the "effects" on that variable of a number of "independent variables" or "predictors." We have placed the above terms in quotation marks because they reflect assumptions about causal direction which are obvious for some variables, quite plausible for others, but somewhat debatable for the post-high school roles and experiences which are of greatest interest to us. We will present additional evidence at various points in support of our causal interpretations, but it is important to acknowledge at this point that the regression analyses reflect our causal *assumptions*; this method (or, for that matter, other methods available to us) cannot prove causation. Moreover, we should further acknowledge that our analysis format reflects our assumptions about the *dominant* direction of causation. Although our method treats these as the exclusive causal paths, we will note that for some relationships we think the real patterns of causation are more complex.

Regression Analysis Strategy

Dependent Variables. For reasons discussed in Chapter 1, the key dependent variables in these analyses are changes in drug use—specifically, in this chapter, changes in response to the questionnaire item about the frequency of cigarette use during the past 30 days. The intervals over which we measure such change range from one to ten years; in all instances we treat the base-year or senior year of high school as the "before" measure, whereas the various follow-up measures (Waves 1 through 5) are treated as "after" measures.

An additional set of dependent variables is created by dichotomizing the drug use measure and then focusing separately in turn upon each of the four possible patterns of change or non-change. For example, a dichotomy distinguishing daily smokers from those who smoke less or not at all permits us to separate the total sample into four subsets, each displaying one of the following patterns:

Stopped -- smoked on a daily basis as a senior but did not at the time of the follow-up.
Started -- did not smoke daily as a senior but did so at the time of the follow-up.
Both -- smoked daily as a senior and at the time of the follow-up.
Neither -- Did not smoke on a daily basis at either time.

The above four groups, characterized in terms of daily smoking at both senior year and follow-up, are each treated as a dependent variable in the analyses which follow. In other words, we will examine what combinations of predictors relate to each of the four patterns, each viewed separately. By looking at all four of these groups, we can look at any category of any predictor variable and see what proportion of the individuals in that category stopped, started, were daily smokers both times, or were daily smokers neither time. As in Table 3.1, we dichotomize smoking at two levels: daily smoking and half-pack a day smoking.

Predictor Variables. The predictor variables of primary interest to us are post-high school roles and experiences measured at the same follow-up point as the dependent variable drug measure. In one sense, these post-high school roles and experiences are "after" measures only, but in another very important sense they also represent "changes," because the "before" characteristics as of the senior year in high school have been held constant across all respondents included in these analyses. As noted in Chapter 1, the present analyses exclude the small numbers of seniors who were already married, and any who were not living in the home of one or both parents or guardians in senior year, thereby holding constant marital status and living arrangements for all seniors. Accordingly, a respondent who is married at a given follow-up can also be considered to have made a particular change in marital status during the "before-after" period under study. Another respondent living in a dormitory at the time of follow-up can be considered to have made a particular change in living arrangements. And still another who was living with parents at time of follow-up can be considered as not having changed living environments. Similarly, those who are full-time students at a given follow-up can be seen as continuing in the student role, whereas those no longer students have changed along that role dimension since the senior year of high school.

These interpretations of "before-after change" illustrated in the preceding paragraph are, of course, great simplifications. Still, our strategy of treating all respondents as basically alike along key dimensions in their senior year enables us to examine simultaneously a complex mix of post-high school experiences and role responsibilities. When we have tried the alternative strategy of looking at changes from one follow-up point to another, we have found that changes along the several dimensions of interest yield a very wide range of possible patterns, thus requiring other kinds of simplifications in order to make the analyses manageable and interpretable.

It may be helpful to consider just one specific example of the general point made above. Our present analyses distinguish among six kinds of living arrangements at each follow-up, and each of these also is taken to represent a change (or non-change) from the one common arrangement for all seniors included in these analyses—that is, unmarried and living with parents (or guardians). However, when we try to consider changes from one follow-up to another, we are faced with 36 (i.e., 6 x 6) possible change (or non-change) patterns. Even when we eliminate the highly unusual combinations (e.g., going from married to being unmarried and living in a dorm), the large number of remaining possibilities demands further simplification.

Several other predictor variables have been included primarily as "controls." We have argued that the use of change scores reduces the need for controlling background factors, and we will see evidence that this is generally true. Nevertheless, we viewed the inclusion of such variables as an important safeguard. Moreover, we will also see that some of these "control" measures strongly predict which individuals will be consistent smokers and consistent non-smokers. The control variables all were measured during the initial data collection during the senior year of high school. Thus they can clearly be seen as prior to the other predictors (all follow-up measures), and also to the changes in drug use. (The question of whether all of these control measures also predate consistent patterns in drug use, such as consistent pack-a-day smoking during and beyond high school, is perhaps open to debate; however, that does not present a serious problem for our primary purposes here.)

Male and Female Similarities, Differences, and Interaction Effects. There are important gender differences in drug use, and also in the rates of entry into such post-high school experiences as marriage and parenthood. Because of the differences in rates of using many drugs, we have included descriptive reports of drug use separately for males and females in this and subsequent chapters. We might have done the same for the regression analyses, except that preliminary analyses carried out separately for males and females consistently led to the conclusion that the similarities in effects were far greater than the differences.[8] Accordingly, in order to avoid an unnecessary and burdensome duplication of effort, we report here regression analyses based on males and females combined.

In order to deal with any overall gender differences in drug use changes, and/or overall rates of drug use, gender is included as the first of the control measures. However, the inclusion of the gender variable is not sufficient to handle interactions in which effects are different (larger, smaller, or in opposite directions) for males versus females. Multiple regression analysis deals only with additive effects, so any interactions must be uncovered in prior explorations and then dealt with using pattern variables. Several such interactions were discovered in our preliminary analyses, and all involve gender distinctions to some extent. Although a single questionnaire item is effective in asking "Are you, or your spouse, pregnant?", we found that being a pregnant female and being a male with a pregnant spouse have a number of quite different impacts on drug use. Similarly, we found it useful to distinguish between mothers and fathers, rather than treat them together in the single category of parents. Some parents are not married, and that can make important differences in the parenthood role—especially for fathers. Accordingly, the parenthood measure used in regression analyses consists of five categories:

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[8] The similarities in effects appear in *unstandardized* coefficients, which are not influenced by sex differences in variance (e.g., more females than males married, and more females parents, at any follow-up point). The coefficients which we report here are unstandardized.

Married father
Married mother
Single father
Single mother
Not a parent

We did not, however, find it necessary to distinguish between husbands and wives more generally, nor between males and females who were unmarried but living with partners. The impacts of these roles/living arrangements were found to be generally similar for males and females.

Format and Rationale for Regression Tables

Table 3.3 presents the results of a series of regression analyses in which change in cigarette use is the central dependent variable. Our analysis strategy is to use several sets of predictor variables in various combinations in order to draw inferences about the extent and nature of overlap in their impacts on changes in drug use. (As we note below, the same basic strategy is applied in predicting the various change patterns based on dichotomies, albeit in an abbreviated fashion.)

First Predictor Set: Background and other Control Variables. We discussed earlier the desirability of controlling a variety of factors which might be related to changes (or "steady states") in drug use, and which might give us a misleading reading of relationships with post-high school experiences if they were not taken into account. Some of these control variables, such as gender and race, can clearly be viewed as background factors; others, such as region and urbanicity (during senior year), may have a lot to do with post-high school environment as well as earlier background; still others, such as high school grades and senior year plans for college, reflect a complex mixture of endowment, ambition, and achievement, all of which can have continuing impacts on individuals. Many of these factors are of considerable substantive interest in their own right, as we will note from time to time; however, in terms of our primary analysis interests here, all of these control variables are viewed as "background," and it is in that sense that we will sometimes use that term to refer to the full set of control measures.

Three other control measures, included primarily for "housekeeping" purposes, are necessary because the present analyses (a) combine cohorts of seniors ranging from the high school class of 1976 through the class of 1988, and (b) include longitudinal time spans ranging from one to ten years. In order to take account of any variations in drug use related to year of graduation, the variable "base year" (1976-1988) is included as a control variable. In order to take account of length of longitudinal time span, the control variables include follow-up number (a set of dummy variables distinguishing first, second, third, fourth, or fifth follow-up), and also a variable distinguishing whether the first of the (otherwise biannual) follow-ups occurred one versus two years after high school graduation.

Even the "housekeeping" control variables described above can be of some substantive interest. In particular, the distinction between follow-ups is an indicator of the number of years post-high school and a close proxy for age (i.e., the first follow-up occurs one or two years after high school when most respondents are age 19 or 20; the fifth occurs nine or ten years after high school when most are 27 or 28). Our presentation of regression results includes the bivariate relationships, thus indicating the extent to which age is linked with changes in drug use; and it includes multivariate results which indicate that some "age effects" are largely explainable in terms of living arrangements.

The control variable measuring base year is an interval scale rather than a set of dummy variables. This means that shifts which are largely straight-line are well captured by the measure, but sharply curvilinear patterns are not. As a corrective for that limitation, we have carried out additional change analyses using change measures adjusted for secular trends (as discussed in Chapter 1). In general, our findings have been that the secular trend adjustments have little or no impact on the particular substantive conclusions reported here.

Second Predictor Set: Student Status and Work Status. The primary "work" of the typical high school senior is to be a full-time student -- at least that is the simplifying assumption we make when we consider that the senior year of high school "holds constant" the variables student status and work status. In fact, however, some students have completed most of their graduation requirements by the second semester of their senior year and thus may no longer need to be full-time students. Also, most are working on part-time jobs, and some are working long hours on those jobs (Bachman, 1983; Bachman & Schulenberg, in press).

After departure from high school a much wider range of role possibilities opens up. Some high school graduates continue directly to college as full-time students, and limit employment to summer jobs. Others become full-time college students, but also work at part-time jobs. Some do the reverse, and work full-time while attending school on a part-time basis. Still others enter military service, and others work in civilian jobs with no further student role. In many important respects, student and employment roles represent alternative kinds of "work" for young adults; certainly the two kinds of role often compete for finite numbers of hours and levels of energy. As a result, various student and employment experiences are sometimes treated as different categories within a single analysis variable (as we have done in earlier analyses—Bachman et al., 1984).

In our present regression analyses, we have found it preferable to maintain student status and work status as two separate predictor variables, recognizing (as shown in Chapter 2) that there are many young adults who are actively involved in both kinds of role. However, our strategy also involves including the student and work variables together as one larger set of measures, with little attempt to assign priority to one versus the other. (One small exception is that we limit the "not employed" category to those who are not students.)

We distinguish three categories of *student status* for the present analyses:

Full-time student
Part-time student
Not a student

Our measure of *work status* consists of the following six categories:

1. Full-time civilian job
2. Military service
3. Part-time civilian job
4. Homemaker (not employed outside the home)
5. Nonstudent, not currently employed
6. All others (including students not employed)

Each respondent is assigned to the lowest numbered category that is applicable. As shown in Chapter 2, category #6 consists largely of students; the others in that category represent fewer than three percent of all follow-up cases.

Third Predictor Set: Living Arrangements, Marriage, Pregnancy, and Parenthood. We turn now to some of the most interesting and complexly interrelated predictor variables in our analysis.

As noted in Chapter 2, we have found it useful to develop a single measure combining current marital status with other living arrangements. Each respondent is assigned to the first applicable category in this ordered scale characterizing follow-up *living arrangements/marital status*:

1. Married
2. Living with a partner of the opposite sex
3. Living with parents
4. Living in a dormitory
5. Living alone
6. All other living arrangements

This categorization of living arrangements/marital status is clearly a measure of *with whom* a respondent lives rather than *where*. Thus, the dormitory residence is of interest because of the companions involved rather than the physical nature of the housing. Similarly, in the case of a married couple living with parents, we consider living with a spouse to be the more dominant factor affecting the individual's lifestyle.

Pregnancy status (as of the time of the follow-up survey) consists of three mutually exclusive categories:

Spouse pregnant (in the case of males)
Self pregnant
Neither (i.e., all other respondents)

This variable is derived from a single questionnaire item with the following wording: "Are you (or is your spouse) currently pregnant?" The question has been worded so as to be applicable to both male and female respondents; among males the wording limits a positive response to those who are married, whereas among females both married and unmarried can indicate pregnancy.

We should recall that the item dealing with pregnancy was not introduced until 1984; thus earlier follow-ups had missing data on this measure. For purposes of the regression analyses, we were willing to ignore the missing data in this case and, in effect, treat the follow-ups from 1984 onward as representing the full set of analysis cases. In fact, however, some of the relationships between pregnancy and drug use have shifted slightly during the relatively short period for which we do have measures (see Bachman, Johnston, & O'Malley, 1991b), and it seems probable that larger shifts would have been revealed if our pregnancy measure had been included in the earliest follow-up surveys. Such shifts are most evident for alcohol use, as we note in Chapter 4. The more general point to keep in mind is that findings relating to pregnancy may be more narrowly time-bound than is true for other measures.

The *parenthood status* measure, as noted earlier, takes into account both gender and marital status, as follows:

Married father
Married mother
Single father
Single mother
Not a parent

This variable obviously reflects some very important current role responsibilities. Perhaps less obvious is the fact that the motherhood categories generally denote individuals who were pregnant at an earlier time, and any long-lasting changes in drug use caused by pregnancy will afterward be captured by the motherhood categories in the parenthood measure. Finally, we should note that parenthood status, like living arrangements/marital status, is also a measure of *with whom* the respondent is living (although that is less true for many of the single fathers).

Causal Assumptions Underlying the Regression Analyses. We are quite comfortable treating all of the dimensions in the first set of predictors as causally prior to those in the second and third sets. And, as we have already indicated, we are interested in the possible impacts of predictors in the second and third sets only when those in the first set are controlled. Finally, we are especially interested in patterns of prediction when the second and third sets are used jointly (along with the first set). Accordingly, for each dependent variable reflecting change in drug use, we report for multiple regression analyses using the following overlapping sets of predictors:

1. Background only (first predictor set, described above);
2. Background, plus student status and work status (first and second predictor sets);
3. Background, plus living arrangements/marital status, pregnancy, and parenthood (first and third predictor sets);
4. Background, plus student status and work status, plus living arrangements/marital status, pregnancy, and parenthood (first, second, and third predictor sets).

It should be clear from the above combinations of predictor sets that our analysis strategy does not commit to one single interpretation of relationships between the second and third predictor sets. On the contrary, the strategy was designed to be neutral as to which is causally prior, while at the same time dealing with the obvious interrelationships between the two sets. In our discussions of findings we will at times offer causal interpretations, but it is important to note here that the analysis format itself is completely neutral.

There is perhaps some departure from neutrality simply in our ordering of the second and third predictor sets. The ordering reflects our view that for most high school seniors a key decision is whether or not to go to college, and then a variety of other decisions—at least as to the timing of other role experiences—flow from that decision about education. To take the most obvious examples, many students defer marriage until after college, and some leave their parents' homes in order to attend school. Given such considerations, we have sometimes been willing to treat student status as causally prior to marital status/living arrangements for young adults (Bachman, Schulenberg, O'Malley, & Johnston, 1990; Schulenberg et al., under review). But we recognize that it is also true that some students choose to marry and, as a direct consequence, change their college plans and behaviors; also, it is surely the case that pregnancy often alters educational plans and behaviors. These are among our reasons for choosing a regression analysis strategy which does not constrain us to force a single ordering of the second and third predictor sets. Instead, it gives us rich opportunities to note ways in which these two predictor sets overlap, with sometimes more than one plausible causal interpretation.[9]

Special Format for Regression Analysis Results. All of the multiple regression analyses reported in Table 3.3 and subsequent tables were carried out following the usual conventions. Pair-wise deletion was used; however, there was very little missing data, except for the pregnancy measure as noted above. Quite a few sets of dummy variables were used, as described above. We report our findings primarily in the form of *unstandardized* regression coefficients, in order that the size of impact on the change measures, and particularly on the transition measures based on dichotomies, may be interpreted directly. Moreover, unstandardized regression coefficients make it easy to observe when relatively rare situations (such as pregnancy) have impacts which equal or exceed more common situations (such as being married). None of the above is much out of the ordinary. What is unusual, however, is the way we have chosen to report regression coefficients based on sets of dummy variables.

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[9] The strategy of using four different combinations of predictor sets linked to drug use change scores is not employed when we turn to the measures of transitions in drug use based on dichotomies. Rather, for these analyses we limit ourselves to all three sets of predictors used simultaneously. This limitation conserves a good deal of space and effort, with little loss of information.

For those familiar with Multiple Classification Analysis (Andrews et al., 1973), we note that our format for presenting regression findings was inspired by some of the features found in that form of regression analysis—features which make the output easier and more straightforward to interpret than is true of typical multiple regression output, especially when dummy variables are involved. In broad outline, the present format has the following characteristics:

1. The starting point is a *constant* which consists of the mean based on all respondents for the dependent variable. In effect, this would represent our "best guess" about the dependent variable if we knew nothing about any of the predictors.
2. For each predictor which consists of a set of *dummy variables*, the format provides a corresponding set of coefficients—one for each category (including the "omitted" category). Each such coefficient indicates the extent of departure from the overall mean (i.e., the constant) which is associated with that category. The first column of entries displays *bivariate* coefficients; each coefficient indicates the average deviation from the overall mean for all cases in a particular category, without taking any other variables into account. The remaining columns are *multivariate* regression coefficients which show such "adjustments to the overall mean" with all other predictors included.
3. For each *continuous* predictor variable, the format presents a coefficient indicating the change or difference in the dependent variable which is associated with a one-point shift in the independent variable. (This can also be used to make adjustments to the overall mean; to do so one must calculate the difference between a particular predictor category and the mean for all respondents on that dimension, and then multiply that difference by the coefficient.)
4. *Summary statistics* include the usual R and R-squared values. In addition there are beta coefficients for each of the predictor variables. In the case of continuous predictor variables, these are conventional standardized regression coefficients. In the case of sets of dummy variables, the beta coefficients are analogous to eta coefficients, except that the other variables in the equation are controlled. Put another way, the beta coefficients for sets of dummy variables are directly analogous to the beta coefficients for continuous predictors, except that the former take full account of the non-linearity among the several predictor categories represented by dummy variables. The advantage over separate coefficients for each dummy variable is that this permits an assessment of the overall impact of the *set*. (This whole approach to dummy variables has the further advantage that it avoids expressing effects as deviations from an arbitrarily-designated "omitted" category. For example, instead of having to describe regional differences in terms of how the Northeast, North Central, and West each differ from the South, we can see how each of the four differ from the nation as a whole—as well as from each other, if we wish.)

One more feature of Table 3.3 and similar tables should be noted. Several sets of differences between R-squared values have been included so as to make clear the unique (i.e., non-overlapping) contributions of both the second and the third predictor sets.

Specific Guidelines for Interpreting the Regression Tables in this Report. The preceding sections of this interlude discuss many of the factors involved in our regression analysis strategy and in our decisions about how to present these findings. We felt that an understanding of these matters would make the tables and related discussion clearer and more meaningful. At this point, rather than attempting anything further in the way of a "how to" guide to the use of Table 3.3 and similar tables, we prefer to turn to the substantive findings for cigarette use, and include guidelines and examples regarding some of the ways in which the tables can be used.

BACKGROUND FACTORS LINKED TO CIGARETTE USE

We begin our examination of Table 3.3 by observing that the constant for change scores is .176, indicating that the mean of all base-year to follow-up change scores amounted to an increase of .176 on the 7-point scale of monthly smoking. This is averaged across all base years and all follow-up intervals, and we will note later that there are some systematic differences along these dimensions. Turning to the constants for transitions in daily smoking, or half-pack-a-day smoking, we see figures which are consistent with those reported in Table 3.1. The transition constants also add meaning to the rather abstract data for change scores—we can see again that the proportions who were starters (or increasers) are somewhat larger than the proportions who were stoppers (or decreasers).

Gender

The bivariate coefficients in the first column of Table 3.3 reflect gender differences noted earlier in this chapter: females increased their smoking somewhat less than males did. Specifically, female changes averaged .043 lower than the constant, so their average change was .133 (.176 - .043); for males the average was .227 (.176 + .051). The regression coefficients in the second column indicate that controlling for other background factors makes no difference—the arithmetic remains the same. The regression coefficients in the third column show the effects of including student and work status in the regression equation: the gender differences are slightly smaller than when only background factors are controlled. The fourth column shows that controlling living arrangements, pregnancy, and parenthood (in addition to background) yields a much more substantial reduction in gender differences; male-female differences in smoking change are now so small as to be no longer statistically significant. The fifth column shows that including all predictors simultaneously reduces the gender differences a bit further.

These findings show that gender as a predictor of change in smoking becomes unimportant once we control some of the other variables. To put it another way, the data examined thus far suggest that if females had been the same as males in terms of living arrangements, parenthood, and pregnancy, they would have increased their rates of smoking just about as much as males did.

The comments above all deal with *changes* in smoking. Another perspective on gender differences focuses on proportions of males and females who were *consistent* in smoking, or not smoking, at both base-year and follow-up times. The coefficients in the ninth column for males and females differ by .066, meaning that 6.6 percent more males than females were not daily smokers at either time. The coefficients in the eighth column indicate that 4.6 percent more females than males were daily smokers at both times (or 17.8 percent versus 13.2 percent, when we add the coefficients to the constant, 15.7 percent). These gender differences, after controlling all of the predictors shown in the table, are more pronounced than the actual (i.e., unadjusted) gender differences for these measures shown in Table 3.1. In other words, if males and females had been the same in terms of all the variables included in our equation, females would have further exceeded males in proportions of daily smokers. This finding is fully consistent with earlier analyses in which we reported that females are, in a sense, "overachievers" when it comes to smoking—they smoke more than would be expected based on other characteristics such as their higher average classroom grades and lower rates of truancy (Bachman, Johnston, & O'Malley, 1981).

Race

The data for race are complex, and tell several stories. The findings also are subject to several caveats, as noted below. Although race differences in drug use are not the focus of this report, we report them here in some detail because a briefer treatment might leave some false impressions. (And, of course, we did not want to omit an important background variable from our analyses.) An additional reason for somewhat more detailed reporting at this point is that the Black-White comparisons provide a good opportunity for demonstrating some of the ways in which the tabular data can be used to provide several perspectives on group differences both in change and in stable patterns of drug use.

The analyses of change scores indicate that Blacks are more likely than others to increase smoking during young adulthood. A comparison of the bivariate coefficients with the regression coefficients shows that controls for background do not at all reduce the Black-White difference, whereas controls including post-high school roles and experiences reduce it somewhat. Still, with all of the predictors included in the equation (fifth column), we see mean changes (average increases) of .254 for Blacks contrasted with .167 for Whites and all others. Earlier (unpublished) analyses examined change data for the first four follow-ups separately, and these revealed that Black-White differences in smoking change were small as of the first follow-up but grew larger with each longer interval.

Our own analyses of high school seniors, and the results of other surveys of student samples, show distinctly lower rates of smoking by Blacks compared with Whites (see Bachman, Wallace, Kurth, Johnston, & O'Malley, 1990; Bachman et al., 1991 for summaries of these findings). The greater increases by Blacks during the post-high school years thus represent a partial "catching up" with Whites and others. This pattern is evident from some additional calculations based on the regression coefficients for changes in daily and half-pack-a-day smoking (columns 6-9, and 10-13, in Table 3.3). First we note that only 8.5 percent of Blacks, compared with 16.6 percent of Whites, were daily smokers at *both* base-year and follow-up.[10] So Whites were almost twice as likely as Blacks to be "consistent" daily smokers. We note also that 80.4 percent of Blacks, compared with 69.6 percent of Whites, smoked daily at *neither* base-year nor follow-up. Slightly more Blacks (9.4 percent) than Whites (8.4 percent) were "starters"—i.e., they were daily smokers at the follow-up but had not been during their senior year (note: this one percent difference is not statistically significant). Most important in terms of understanding the change scores, only 1.7 percent of Blacks "stopped" daily smoking, compared with 5.4 percent of Whites.

Why did fewer Blacks than Whites quit daily smoking? The obvious answer is that a much smaller proportion of Blacks were daily smokers to begin with—i.e., as high school seniors. Combining those who continued daily smoking and those who quit, we can see that 10.2 percent of the Black cases smoked daily as seniors, and about one in six of these (representing 1.7 percent of all Blacks) had quit as of the follow-up. For Whites, 22.0 percent of all cases smoked daily as seniors, and about one in four of them (5.4 percent of all Whites) had quit as of the follow-up. Thus Blacks who smoked daily in high school were somewhat less likely to quit than Whites who smoked daily; but the main reason for the low proportions of Black quitters is the very low proportion who were daily smokers during high school. Carrying out similar calculations for half-pack-a-day smoking reveals even sharper Black-White differences; about fifteen percent of Whites and under two percent of the Blacks included in these panel analyses were half-pack smokers as seniors, and in each group about one in four quit as of the follow-up.

Several cautions must be kept in mind when considering these data on Black-White differences. Perhaps most fundamental is the fact that panel attrition rates are greater among Blacks than among Whites (as indicated in Chapter 2), and panel attrition led to disproportionate losses of those Blacks who smoked as seniors. Additionally, of course, the computations presented above represent a very abstracted perspective on race differences—they are estimates of the differences which might be expected if the race groups were the same in terms of student and work roles, living arrangements, pregnancy and parenthood, grades and college plans, and other background factors.

We have carried out other quite extensive regression analyses of high school seniors' reports of cigarette use and other drug use, and these also have shown that large Black-White differences remain after controlling many factors (Bachman et al., 1990; Wallace & Bachman, 1991). But Wallace (1991) has also demonstrated that many of the predictor measures which are important for Whites are less so for Blacks. Our tentative conclusion based on these other analyses is that the typically studied background factors do little to "explain away" lower rates of cigarette use by Black students. Our present analyses suggest similar conclusions about the impacts of post-high school experiences on young adults: substantial Black-White differences (most notably the continuing lower rates of smoking by Blacks) remain after controlling for both background and current roles and experiences. Further analyses, which lie well outside the scope of the present report, will need to look for other potential explanations of Black-White differences in rates of smoking and other drug use. One such factor, currently being explored, is the impact of specific religious affiliations on drug use.

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[10] The calculation combines the constant (.157) with the regression coefficients for Blacks (-.072) and Whites (.009), all from the eighth column. The resulting *proportions* (.085, and .166) are simply converted to *percentages* in our discussion. Similar procedures are followed throughout this and subsequent chapters.

Region and Urbanicity

Region. The surveys of high school seniors have regularly shown highest rates of cigarette use in the Northeast, and lowest rates in the West. Such differences are evident in Table 3.3 also; we can see that the Northeast has the highest proportions who were daily or half-pack smokers at both base-year and follow-up, and the lowest proportions in the "neither" category, and the opposite is true for the West. It is noteworthy that the differences just noted are multivariate, indicating that controlling for the other variables in the analysis does not eliminate regional distinctions in smoking.

Further evidence that multivariate controls have relatively little impact on regional differences can be seen when we examine change scores. The bivariate regional differences in smoking changes are not at all large, and inclusion of other predictors makes very little difference (i.e., the multivariate coefficients are nearly the same as the bivariate ones).

Urbanicity. The coefficients indicate that those in large urban areas have smaller average increases in smoking than those who (as seniors) lived on a farm (a difference of about .14 on the seven-point monthly smoking scale). In the years following high school, those who had lived in rural areas or farms were more likely to initiate daily or half-pack smoking, and less likely to quit; the opposite is true for those from large urban areas. The measure of urbanicity has multivariate coefficients which are very similar (indeed, nearly identical) to the bivariate coefficient, thus indicating that urbanicity does not overlap with (and, therefore, cannot be explained by) the other predictors in relationships with smoking changes.

High School Grades and College Plans

Grades and college plans of high school seniors generally show very small and nonsignificant relationships with subsequent *changes* in their smoking (with one exception, discussed below). On the other hand, these variables are strongly related to *stable* differences in smoking. Those planning for college, and those with high grades, are much less likely to be smokers.

The stronger relationship in the multivariate analysis involves grades; with each step upward on the nine-point scale, the likelihood of being a non-daily smoker at both base-year and follow-up increases by 4.3 percent. In other words, given other things equal (although, in fact, they are not), someone with a straight-A average in high school would have about an 84 percent likelihood of not being a daily smoker at either base-year or follow-up, whereas a D student would have only about a 49 percent likelihood. Looking at the other aspect of stable smoking, the proportions who smoked at both base-year and follow-up are estimated at about 7 percent of the straight-A students versus about 30 percent of the D students, again with all other factors controlled in the regression analyses.[11]

There is one statistically significant relationship indicating that smoking increases are slightly *higher* among those who, as high school seniors, planned to attend college. This relationship is only evident, however, when current student status is included in the equation (see third and fifth columns in Table 3.3). Among full-time students, smoking increases are lower than average, and these would seem to "cancel out" the relationship involving college plans—except, of course, for those who planned to attend college but did not do so. In essence, the two variables combine to give us an "under-achievement effect"—those who did not attain their college aspirations were more likely to increase their smoking, albeit only slightly.

We will have more to say about high school grades and plans for college when we turn later to actual college attendance. For the present, we note again that although the grades variable shows strong relationships with patterns of *consistent* smoking or non-smoking, the bivariate and most multivariate relationships with *change* scores are trivially small and nonsignificant. This is a good example of the success of the change score measures in "canceling out" those relationships which are consistent and essentially unchanged across time, thereby enabling us to focus on lifestyle factors which may have changed and which may have contributed to changes in drug use.

Other Control Variables

Base Year. The coefficients in Table 3.3 indicate what many of our reports and other analyses have already told us: cigarette smoking had been declining somewhat during the late 70's and early 80's (see O'Malley et al., 1986, 1988; Johnston et al., 1991). In the present analyses, with other factors controlled via regression analysis, the coefficient of .012 per year (ninth column) indicates for example, that about 12 percent more individuals from the high school class of 1986 than from the class of 1976 were daily smokers at *neither* base-year nor follow-up. Similarly, about 9 percent fewer from the class of 1986 were daily smokers at *both* times (eighth column).

More important for present purposes, the variations in overall smoking rates from one high school class to another have had trivially small (and generally non-significant) effects on *changes* in cigarette use. Year of graduation is, of course, controlled in all of the regression analyses; however, this is another instance in which the change scores have served to make such controls less crucial.

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[11] To simplify these calculations we have assumed that the average grade across all cases in this analysis is B, or 6 on our 9-point scale. So, for example, if the likelihood of not being a daily smoker at either base-year or follow-up is 70.7 percent for all cases, and if each point on the grade scale above the mean (i.e., 6) increases that likelihood by 4.3 percent, then the estimate for straight-A students is 70.7 percent plus three times 4.3 percent, or 83.6 percent.

Age at Follow-Up. As noted earlier, the control variable distinguishing among follow-ups is a reasonably good proxy for age. When we look at the bivariate coefficients for the follow-ups, or the multivariate coefficients with only background variables included (second column), we see a curvilinear trend with age: those in their early twenties (second and third follow-ups) show the largest average increases over their smoking levels as seniors, whereas those in their late twenties (fifth follow-up) show smaller increases. But when the regression equation is expanded to include living arrangements, pregnancy, and parenthood (fourth and fifth columns), these differences among the follow-ups are sharply reduced (and no longer significant). This clearly suggests that some of the factors introduced in the third set of predictors can account for most of the age-related differences.

STUDENT AND WORK STATUS LINKED TO CIGARETTE USE

How do student and employment roles during the post-high school years relate to changes in cigarette use? The bivariate relationships are shown in the first column of Table 3.3, and multivariate relationships with background factors controlled are shown in the third column.

Student Status

In Chapter 2 we saw that just over half of all participants in the first follow-up were full-time students. By the second follow-up full-time students comprised somewhat more than a third of the sample. At later follow-ups the proportions were much smaller. Thus we can characterize the full-time student role as involving substantial numbers in their late teens and early twenties, but relatively few in the later years.

The bivariate coefficients in Table 3.3 show that both full-time and part-time students had smaller increases in smoking rates than those who were not students; however, these relationships are not very strong. Controlling for background factors, and also work status, leaves this small relationship virtually unchanged (i.e., the regression coefficients in the third column are almost identical to the bivariate coefficients).

(Interestingly, comparing the third and the fifth columns in Table 3.3 shows that the regression coefficients are slightly enlarged when the third predictor set is included in the equation. This small "unmasking" effect occurs in the presence of controls for living arrangements, and closer inspection suggests that the most important contributor is dormitory life. The "dormitory effect" is about twice as large as the unmasking, but still too small to be significant.)

The most important difference between those who do and do not go on to college after high school does not involve changes in smoking rates, but rather the likelihood of smoking during high school. Those who are college-bound are far less likely to be smokers during their high school years—and, because smoking is such a stable behavior, they are also less likely to be smokers in subsequent years. The very fact that many fewer smoke at all would lead us to expect smaller increases in change scores when averaged across all cases. There is some evidence in Table 3.3 (eighth and ninth columns) that full-time students are more likely than others to have been daily smokers at neither base-year nor follow-up, and less likely than others to have been daily smokers at both times. But these regression coefficients show mostly what differences in smoking rates may be added by actual attendance at college. The differences in smoking rates between college students and non-students are much larger than the specific regression coefficients for the full-time student category would suggest, because such differences are shaped much more by events during high school (as evidenced by the data on grades and college plans, discussed earlier).

The complex relationships between high school grades and aspirations, college attendance, and other factors as they impact on drug use, have been examined and discussed extensively in other reports which also used Monitoring the Future panel data (Bachman, Schulenberg, O'Malley, & Johnston, 1990; Schulenberg et al., under review). Our interpretation of the findings is that the link between college attendance and low smoking rates is primarily indirect, reflecting three relationships which are more basic: academically successful high school students are likely to go to college, they are unlikely to be smokers during high school, and high school non-smokers are fairly unlikely to become smokers later.

Work Status

Being employed full-time in a civilian job shows little relationship with changes in smoking, either at the bivariate level or in multivariate analyses. Neither do we find clear and consistent relationships between smoking changes and several of the other dimensions included under the heading of work status (see Table 3.3). There are two important exceptions; full-time military service is linked to a greater than average increase in smoking, while being a full-time homemaker is associated with little or no increase.

Military Service. Turning first to the relationship between military service and increases in smoking, we can see that the bivariate coefficients shown in the first column of Table 3.3 are changed relatively little when controls for background and student status are introduced (contrasting the first and third columns). Further controls for marital status, parenthood, and other aspects of living arrangements leave the coefficient for military service essentially unchanged (fifth column). Table 3.3 also indicates that those who entered the military were about half again as likely as their age-mates to make the transition into daily smoking (seventh column), or into half-pack-a-day smoking (eleventh column).

Homemakers. The bivariate coefficient in Table 3.3 indicates that those who identify themselves as full-time homemakers do not, on average, increase their rates of smoking between base-year and follow-up (whereas the total sample does). Controlling for student status has very little effect on these coefficients (see third column); however, once marital status, parenthood, and pregnancy are added to the equation (see fifth column), the "homemaker effect" virtually disappears. Thus the most parsimonious interpretation is that homemakers are relatively unlikely to increase smoking because they are generally married (and often parents and/or pregnant), not because there is something else special about the role of full-time homemaker.

Unemployment. The relationship between our measure of unemployment and changes in cigarette smoking is small and non-significant. Unemployment does not, it appears, drive young adults to smoke or smoke more. Neither, however, is there any evidence that unemployment (including any resulting shortage of funds) leads to lowered rates of smoking. Table 3.3 does show that those who were unemployed at (or near) the time of the follow-up were more likely than average to be daily and half-pack smokers at both base-year and follow-up.

LIVING ARRANGEMENTS AND MARITAL STATUS LINKED TO CIGARETTE SMOKING

The fourth column in Table 3.3 shows regression coefficients for marital status and other living arrangements, pregnancy, and parenthood (i.e., the third predictor set), along with background variables (first predictor set), all as predictors of changes in cigarette smoking. The fifth column in the table shows regression coefficients when all of these predictors plus the student and work status measures (second predictor set) are included in the equation. Comparisons between the fourth and fifth columns can reveal some of the ways in which variables in the third and second predictor sets overlap.

Marital Status

We noted earlier that we combine marital status with other indicators of living arrangements because of our primary interest in *with whom* the respondent lives. Among all six categories of living arrangements, the category of being married is likely to be the most permanent. It is also arguably the most important in terms of the depth and breadth of interpersonal relationship involved. As we shall see in later chapters, marital status is an important correlate of changes in alcohol and illicit drug use—behaviors which for most young adults are heavily influenced by social situations.

How does marital status relate to changes in cigarette smoking, a behavior which by young adulthood generally reflects dependence more than the impacts of social situations? The bivariate coefficient suggests a modest negative impact, and the multivariate coefficient in the fourth column shows that the effect is unchanged by controls for background, pregnancy, and parenthood. Interestingly, when student and work status are also controlled (fifth column), the negative effect of marriage on smoking change is slightly enhanced. Taking into account the overall increase in amounts of smoking, we can say that married respondents increase their smoking less than half as much as the total sample.

Consistent with the data for *changes* in smoking, the data on *transition patterns* show that those who married were slightly less likely to have started daily (or half-pack) smoking and slightly more likely to have stopped. Consistent smoking or non-smoking, on the other hand, was neither more nor less likely among those who married between base-year and follow-up.

Living Unmarried with a Partner

Individuals who indicated in the follow-up questionnaire that they were "living with a partner of the opposite sex" showed greater than average increases in cigarette smoking, a pattern that is largely independent of controls for background and other predictor variables.

The data on transition patterns indicate that those living with a partner were at least half again more likely than those in any other post-high school living arrangement to have been daily, or half-pack, smokers before leaving high school. Also, among those who did not smoke at that level as seniors, cohabitation is associated with an increased likelihood of initiating daily or half-pack smoking.

Contrasting these findings with those for marriage, we can see that the cohabitants are, on average, somewhat different individuals before leaving high school (i.e., more likely to be smokers); they are also more likely to increase their smoking after high school. It thus appears, at least with respect to smoking, that cohabitation and marriage are not closely parallel living arrangements.

Living with Parents

Those living with parents at the time of follow-up showed essentially average levels of change in cigarette use. The data on transitions show that they were slightly more likely to be daily or half-pack smokers at *neither* base-year nor follow-up, and also slightly more likely to stop smoking at either level.

Living in a Dormitory

Living in a dormitory also showed little impact on changes in cigarette use. It is interesting to note, however, that the bivariate coefficient is slightly negative, that controls for background result in an even smaller negative coefficient, but including controls for student status shift the coefficient to slightly positive. (At the same time, the coefficient for student status becomes a bit more strongly negative.) Although the relationship is not large enough to be significant, given a limited number of respondents in dorms, the pattern suggests that those in dormitories may be very slightly more likely than other students to increase their smoking. On the other hand, the data on transitions also show that those in dorms are more likely than average to be consistent non-smokers.

Living Alone, and Other Living Arrangements

Among those not in one of the previous four living arrangements, we further distinguished between those living alone and those in all other living arrangements. The latter typically were living in apartments or houses shared with several others, but the category also includes most of those in military service (i.e., those living in barracks, shared off-base housing, etc.). With respect to changes in cigarette smoking, the two categories are highly similar, as shown in Table 3.3.

Those in the living alone and other living arrangements categories were distinctly more likely than average to increase their smoking after high school, as shown by the bivariate coefficients. Controlling for background factors, plus pregnancy and parenthood, reduced the coefficients slightly (fourth column), and further controls for student and work status reduced the coefficients a bit more. The data on transitions show that these individuals were slightly more likely than average to initiate daily or half-pack smoking, and a bit less likely than average to be consistent non-smokers.

PREGNANCY AND PARENTHOOD LINKED TO CIGARETTE USE

We treat pregnancy status and parenthood status as two distinct variables (two sets of dummy variables) in these analyses, although they are obviously interrelated. Most importantly, if there are effects of pregnancy on drug use which lead to more permanent changes in drug use behavior, these will likely be included among (entangled with) any "parenthood effects." In general, we cannot disentangle such interrelationships in these analyses; we can take note of them when we think they are important.

Pregnancy

Among factors linked to changes in smoking, the one which stands out most clearly and consistently is pregnancy. While average levels of smoking for all other subgroups in Table 3.3 either increased or remained essentially unchanged (based on the bivariate coefficients added to the constant), the smoking levels for pregnant women decreased markedly. With other factors controlled (fourth and fifth columns in Table 3.3), the regression coefficients for change in smoking remain nearly as strong as the bivariate coefficient. But the findings are more easily interpreted when we examine the transition measures; pregnant women are much more likely than average to stop smoking, or at least to reduce to less than daily smoking or less than a half-pack daily.

We can bring the above observations into sharper focus by using the regression coefficients to compute smoking transition patterns, contrasting women who were pregnant with those who were not (at time of follow-up). Using the regression coefficients to estimate "subgroup data" in this fashion has two advantages: first, it is an attempt (albeit imperfect) to control all other variables included in the equation; second, it provides a quick and essentially cost-free procedure for examining any subgroup that can be defined in terms of the variables in the regression equation (and, we note, interested readers can follow the same procedure to compute subgroup estimates based on any combinations of variables included in the regression analysis tables).

For present purposes, we are interested in exploring the possible effects of pregnancy on use of cigarettes and (in later chapters) on use of other drugs. We note that the large majority of pregnant women are married, and marriage is related to patterns of change in drug use. Thus, a comparison of all pregnant women (mostly married) with all non-pregnant women (many unmarried) would run at least some risk of confusing matters. We prefer, therefore, to concentrate primarily on married women, comparing those who were pregnant with those who were not. (But we also include data comparing all pregnant women with all non-pregnant women.)

Table 3.4 presents actual transition patterns in daily smoking for pregnant and non-pregnant women. (Adjusted rates derived from the regression analyses in Table 3.3, including controls for background and other factors, produced largely similar results; it thus appears that pregnancy effects are largely independent of these other factors.) Among all married women who were pregnant at the time of the follow-up, 14.0 percent had been daily smokers as seniors but had ceased smoking daily by the time of the follow-up (first column in the table), whereas 11.2 percent had smoked daily as seniors and continued to do so (third column). Looking at these two transition groups (first and third columns) together, we can calculate rates of "quitting" or at least reducing among those who had been daily smokers during high school. In the case of married women who were pregnant during the follow-up, we see (fifth column) that 25.3 percent (i.e., 14.0 percent plus 11.2 percent—plus rounding error) had been daily smokers during their senior year of high school, and we see also that over half of them (14.0/25.3 = 55.6 percent) had stopped daily smoking (sixth column). Among married women who were not pregnant at the time of the follow-up, a virtually identical proportion (24.3 percent) had been daily smokers as seniors; however, only about one third of them (32.9 percent) had stopped daily smoking.

As the bottom portion of Table 3.4 shows, the results are not greatly changed when we include all women rather than just married women; it is still the case that about half of the pregnant women quit daily smoking, compared with just over a quarter of the women who were not pregnant. However, when we focus specifically on the (relatively small) subset of pregnant women who were not married (middle portion of Table 3.4), we see several important contrasts to the pregnant women who were married; specifically, those who were unmarried were somewhat more likely to have been smokers as seniors, were much less likely to have quit during pregnancy, and were more likely to have initiated (daily) smoking after high school.

Table 3.5 parallels Table 3.4, but focuses on half-pack or more smoking. As shown in the right-hand portion of the table (fifth column), about 15 percent of the female cases had been half-pack-a-day (or more) smokers as high school seniors (an additional 10 percent had smoked daily, but less than a half-pack). The quitting rates for these half-pack smokers were much the same as for all daily smokers; among those pregnant at the time of follow-up, about half had quit, compared with fewer than a third of those not pregnant (sixth column).

Thus far in this section on pregnancy we have, not surprisingly, concentrated on females. Now let us consider whether there is any evidence that having a pregnant spouse influences the smoking rates of males. The relevant data can be summarized very quickly: the regression coefficients in Table 3.3 show no statistically significant relationships between spouse pregnancy and change scores for cigarette use; if anything, the fact that these non-significant coefficients are positive suggests that smoking levels may increase very slightly among males with pregnant spouses.

Summarizing these several findings regarding pregnancy, we can say that (a) about half of the pregnant women who had been regular smokers during high school were able to stop, or at least substantially reduce, their use of cigarettes; (b) the relationship is quite specific, holding for pregnant women but not their husbands; and (c) it is largely independent of background, student status, and employment status. In recent years it has been widely publicized that cigarette use by pregnant women can have adverse consequences for their fetuses, and this concern for their unborn children appears to have provided the motivation for large numbers of young women to do something which is very difficult for most smokers. For some, the reduction or cessation of smoking is only temporary, and the habit is resumed after pregnancy. But, as we see next, motherhood also is associated with reduced smoking, and it seems likely that at least a portion of any "motherhood effect" is actually a longer-term effect of reduced smoking during pregnancy. (Eventually we will be able to examine that proposition more closely using data from the Monitoring the Future project; however, because the questions on pregnancy were introduced only relatively recently, we do not yet have sufficient follow-up data to look at the long-term outcomes of reduced smoking during pregnancy.)

Parenthood

As noted earlier, exploratory analyses found that most relationships examined in this report were similar enough across males and females that it was not necessary to make gender distinctions. However, in the case of parenthood, as in the case of expectant parenthood, such distinctions proved to be quite important. We also found it necessary to distinguish between parents who were married and those who were not.

Married Mothers. The bivariate coefficient (first column in Table 3.3) indicates that married mothers, on average, did not increase their levels of smoking between senior year and follow-up. (Specifically, while the average smoking change score for all cases was 0.176, as indicated by the constant, when we add the coefficient of -0.180 for married mothers the result is essentially zero.) Some tendency to have lower than average increases in smoking is also evident with controls for background, living arrangements, and pregnancy (fourth column). The multivariate relationship takes account of overlaps with the more general effects of gender and marital status, and probably also overlaps slightly with the much larger effect of pregnancy (i.e., some of the married mothers happened to be pregnant again at the time of the follow-up survey). The "motherhood effect" which remains after these controls is relatively small.

Single Mothers. The findings for single mothers are quite different from those for married mothers. The bivariate and multivariate coefficients reflecting changes in smoking are small and not statistically significant. However, the transition data indicate that single mothers were more likely than average to have been daily or half-pack smokers during high school and to have continued the practice.

Married Fathers. The coefficients for change in smoking are slightly, but not significantly, positive for married fathers—rather similar to what we found for males with a pregnant spouse. The transition data also show that married fathers were a bit more likely than average to have been daily or half-pack smokers during high school and afterward.

Single Fathers. Unlike single mothers, many single fathers do not live with their children; thus the impact of parenthood on their lifestyles is likely to be more limited than is true of the other categories of parents. Thus we are hesitant to assume that changes in smoking (or other forms of drug use) result directly from single fatherhood; various other factors associated with single fatherhood may be the more likely causal factors.

In any case, the bivariate coefficient in Table 3.3, along with the constant, clearly shows that increases in smoking among single fathers were nearly three times as large as those for all cases (and well over twice as large as those for all male cases). The multivariate coefficients show that relatively little of this difference overlaps with the other predictors. The transition data further show that those who became single fathers were distinctly more likely than other males to have smoked daily during their senior year, and to have continued as of the follow-up; moreover, single fathers who had not been daily smokers in high school were almost twice as likely to start (compared with other males who were not daily smokers in high school). Much the same holds true for smoking a half-pack or more per day.

It is of interest that these findings for unmarried fathers repeat, albeit more strongly, the patterns we noted earlier for unmarried cohabitants (both male and female). Within both categories, high school smoking rates had been distinctly higher than average. The fact that these groups had more smokers to begin with may be one of the factors underlying their large increases in change scores, because increases occur primarily among those who had smoked—at least to some extent—during high school. Of course, both categories also tend to include individuals who feel less constrained by social strictures against sex outside of marriage; perhaps this reflects more general tendencies to disregard constraints and to take risks, which may also be a factor in cigarette smoking.

INTERLUDE II: ISOLATING AND INTERPRETING "UNIQUE EFFECTS"

The bottom portion of Table 3.3 presents bivariate eta and multivariate beta coefficients showing the overall impact of each variable or variable set used in the regression analyses. Also shown for each regression analysis are multiple R-squared values (both unadjusted and adjusted for degrees of freedom). Finally, at the bottom of the third and fourth columns are differences between R-squared values designed to indicate the unique effects of the second and third predictor sets, as explained below.

We should first note that the R-squared values for *change* scores are not very large at all. In line with our observation that smoking seems largely unaffected by most experiences during young adulthood, we see that the full set of predictors explains only about one-and-one-half percent of the variance in smoking changes (.0145 of the variance adjusted). About the same proportion (one or two percent) of the variance in starting daily smoking, or half-pack smoking, can be explained by the predictors. But the same predictors can explain a far higher proportion of variance (seven to ten percent) in *consistent* smoking or non-smoking. An examination of beta coefficients shows that grades during high school are the strongest predictor of consistent smoking or non-smoking, a relationship which is shared with college plans and with actual college attendance. Additionally, living arrangements and parenthood status show important relationships with consistent smoking and non-smoking.

Isolating "Unique Effects"

We are not making strong claims for being able to isolate effects of variable sets in any precise fashion (in spite of the fact that the calculations are carried out to several decimal places). The dimensions we are treating as predictor variables clearly overlap in complex ways that do not permit precise isolation. Nevertheless, it has been useful at times to be able to distinguish various sets of predictors and ask to what extent their effects seem to be overlapping and to what extent their effects are separate. The calculations at the bottom of Table 3.3, and similar calculations in later regression tables, provide such distinctions.

Effects Which Do Not Overlap with Background. The R-squared value for the first two predictor sets, background plus student and work status, is 0.0082 (adjusted for degrees of freedom), whereas for background only the value is 0.0047. The difference of 0.0035 can be said to represent the effects of the second predictor set which are non-overlapping with the first. In other words, the effects of student and work status which are above and beyond background differences amount to about one-third of one percent of the variance in smoking changes.

A similar set of calculations indicates that the effects of living arrangements, pregnancy, and parenthood, which together constitute the third set of predictors, are larger than the effects of student and work status. Together with background, these predictors yield an R-squared value of 0.0111, which is 0.0065 larger than the value for background alone. It thus appears that the effects of living arrangements, pregnancy, and parenthood which are independent of background factors amount to about two-thirds of one percent of the variance in smoking changes.

Effects Independent of Both Background and Other Predictors. The calculations above leave open the question as to whether the second and third predictor sets overlap with each other or are largely independent in their relationships with smoking changes. The final set of calculations in the third and fourth columns provides the answer to that question. Here we distinguish between the R-squared value for all three predictor sets and the R-squared values for two of the three sets, with the difference indicating the unique contribution of the omitted set. Thus, for example the final (adjusted) entry in the third column is 0.0034, calculated as the difference between the 0.0145 R-squared value in the fifth column and the 0.0111 value in the fourth column (before rounding), and reflecting the impact of student and work status which does not overlap with either background or the predictors in the third set.

It is worth noting that the two kinds of unique effects—those removing just background, and those removing both background and the other post-high school predictor set—are almost equal in value. In other words, there is appears to be very little overlap between the second and third predictor sets when it comes to predicting changes in cigarette use. We must keep in mind that this observation applies only to the change data, not the consistent patterns of smoking or non-smoking. We should also note that the one sizeable overlap which we did observe when examining the unstandardized regression coefficients—the sharply reduced coefficient for "homemaker" when marriage, pregnancy, and parenthood were added to the equation—involves so few cases as to have little impact on the R-squared values.

That a genuine overlap such as the one described above could go apparently "undetected" by the R-squared comparisons points to a more general limitation of focusing on explained variance. Some of the more interesting roles and experiences in these analyses involve relatively small numbers of cases; consequently, even when there are fairly large differences, such as those for pregnancy or military service, their contributions to R-squared values are necessarily limited. Thus, we will continue to concentrate primarily on the unstandardized regression coefficients, because we feel that they are the most readily interpreted measures of the impacts of a wide range of post-high school roles and experiences.

Interpreting Unique Effects and Overlaps

We have illustrated above how we isolate effects of the second and/or third predictor sets which are independent of background (the first predictor set) or each other. A literal interpretation is quite simply that the variables in one set have relationships with a change measure (in this chapter, changes in cigarette use) which are independent of the other variables as measured here. That leaves, of course, the problems of limitations in measurement as well as the more fundamental problem of whether certain relevant concepts have not been included at all in the equation. Accordingly, we caution against a too-literal interpretation of the term "unique."

The more interesting issue involves overlaps, and especially the question of how to interpret overlaps between the second and third predictor sets. As we have just seen, there are few such overlaps when it comes to explaining changes in smoking level after high school. However, if the focus is on *levels* of post-high school smoking rather than *change*, then the overlaps become important; we have discussed and illustrated this elsewhere (Bachman et al., 1990; Schulenberg et al., under review). Changes in the use of alcohol and the use of illicit drugs also involve overlaps between the second and third predictor sets, as shown in subsequent chapters. When such overlaps appear, we often offer some interpretation as to causal direction. As noted earlier in this chapter (Interlude I), we assume that decisions and behaviors involving post-high school education, for example, are usually causally prior to those involving marital status, living arrangements, pregnancy, and parenthood.

CHAPTER 4. CHANGES IN ALCOHOL USE

Among all of the drugs examined in the Monitoring the Future study, alcohol is by far the most widely used. Nearly all high school seniors and young adults have tried alcohol; and although the proportions have been declining in recent years, it is still the case that over two-thirds of seniors in the classes of 1976-1988 (the classes included in these analyses) had used alcohol at least once during the month prior to the survey (Johnston et al., 1991). The proportions reporting any use during the past month are even higher during the years after high school; moreover, the frequency of use, especially among males, rises during the post-high school years. It is hardly surprising that such an increase occurs, given that the purchase of alcohol generally becomes legal during the first few years after high school. Still, most young adult drinkers in our surveys report only occasional use—typically once or twice per week.

If such occasional use involved only one or two drinks, there would be little reason for concern. In fact, however, many of the occasions involve five or more drinks, and such instances of heavier use are particularly worrisome. One reason for concern is that some individuals will continue or increase such heavy use over a long period of time, and this carries risks of serious health consequences. Another more immediate reason for concern is that heavy use, however often it occurs, is likely to produce at least short-term impairment and thus dramatically increase the likelihood of a variety of undesirable outcomes—accidental injuries, criminal behavior, violent behavior, risky sexual behavior, drowning, fires, and of course, automobile related deaths and injuries.

Post-high school use of alcohol, including heavy use, is quite predictable from senior-year drinking patterns. Taking account of measurement reliability, we estimate stability to be about .80 during the first year after high school, and about .90 during subsequent years (derived from O'Malley et al., 1983 and also Bachman et al., 1984). These estimates are impressively high, suggesting that much of post-high school drinking behavior is influenced by factors already present before the end of senior year, including factors which continue to exist and exert influence through young adulthood. Nevertheless, a good deal of room for change remains, especially over spans of several years or more. Compared with cigarette consumption, for example, nearly twice as much variance in alcohol use is *not* interpretable in terms of senior-year use and related factors.

What kinds of experiences in the post-high school years are likely to affect alcohol consumption? Our earlier analyses, based on follow-up data collected one to three years after graduation, revealed some important impacts of marital status and other aspects of living arrangements (Bachman et al., 1984). Our present analyses permit us to explore such relationships over a much longer period, and also to examine a number of additional factors. Before looking at the impacts of these post-high school experiences, however, it will be useful to review overall changes in alcohol use during each of the five base-year to follow-up intervals.

PATTERNS OF CHANGE IN ALCOHOL USE

Our extensive analyses utilizing the full Monitoring the Future cohort-sequential design for the years 1976 through 1986 revealed no *cohort differences* in alcohol use, a very small *period effect* (secular trend), and somewhat larger *age effects* (O'Malley et al., 1988a; 1988b). Specifically, we judged the period effect to involve no change from 1976 through 1979, and thereafter a decline of about a half percent each year in the proportions of monthly users of alcohol, and in the proportions who reported at least one instance of heavy drinking (five or more drinks) during the two weeks preceding the survey. More recent analyses of trends suggest a greater ratio of decline between 1986 and 1990 (Johnston et al., 1991).

An important age effect is that the proportion reporting any use during the past month increased by about three percent with each additional year from age 18 (when about two-thirds reported drinking during the past month) through age 21 (when about three-quarters did so). During the same age period, the proportions reporting any heavy drinking during the preceding two weeks also rose from about 37 percent at age 18 to about 42 percent by age 21. These age-related increases in alcohol involvement are linked with other changes in post-high school experiences, as we shall see; in addition, they may reflect the attainment of "legal age" for the purchase of alcohol.

Another age effect, which we find more interesting, is that *after* age 21 the proportions reporting heavy drinking *declined* by nearly two percent with each additional year of age; thus, by age 28 the proportion was down to about 30 percent. The decline in instances of heavy drinking does not, however, signify that large numbers of young adults quit entirely; the proportion reporting *any* use of alcohol in the past month did not decline after age 21—it remained steady at about three-quarters of all young adults.

Age effects by themselves would not be distorted by our present procedures of combining data across all available cohorts; thus the age effects described above do not present an analysis problem. But the other kinds of effects could prove troublesome and would be confounded with the age effects. In fact, however, there are no discernible cohort effects, and the secular trend downward after 1979 is too small to present a serious problem. (We observe in the next chapters that even the substantially larger secular trends for marijuana use and cocaine use do not seriously distort our analyses of change scores.)

Changes and Transitions in Current (Monthly) Alcohol Use

In preliminary analyses we examined findings for the number of occasions of alcohol use during the past year (which we also term "annual use"), and we separately examined findings for alcohol use during the past thirty days (which we also term "current use"). The patterns of findings for the two intervals were generally similar; however, the current use (thirty-day) measure is more closely linked to the current social environment, and thus is preferable as a criterion measure for analyses linking post-high school experiences and environments to drug use. A further reason for preferring the thirty-day measure of alcohol use is that the very widespread involvement with at least occasional alcohol use renders the twelve-month change measures rather insensitive; more than 80 percent of both males and females reported at least some alcohol use during the year preceding both base-year and follow-up, leaving relatively few cases of changes "into" or "out of" annual alcohol use. By way of contrast, Table 4.1, Part B (the "Yes-Yes" category), shows that about two-thirds of males and slightly more than half of females reported alcohol use during the month preceding both base-year and follow-up surveys.

Still another reason for focusing attention primarily on current use rather than annual use data is that we believe recall is more accurate for the shorter interval. We have reported elsewhere that there is a mismatch between monthly and annual drug use reports, such that the total use during the past year is a good deal lower than what would be expected based on an extrapolation from the monthly data (Bachman & O'Malley, 1981). For these several reasons, our analysis of alcohol use focuses on the current use data. (In the next chapters dealing with illicit drugs, the considerations just discussed also apply; however, the frequencies of use are lower for marijuana and much lower for cocaine, and that tends to limit the value of the current use measures as criteria in change analyses.)

Table 4.1, Part A, presents mean base-year, follow-up, and change data for monthly alcohol use by males and females across each of the five analysis intervals. The scale of monthly use, on which these scores are based, consists of the following categories:

1 = 0 occasions
2 = 1-2 occasions
3 = 3-5 occasions
4 = 6-9 occasions
5 = 10-19 occasions
6 = 20-39 occasions
7 = 40 or more occasions

The mean change scores in Table 4.1, Part A, reveal some age-related increases and decreases in frequency of alcohol use, which seemed to reach its peak in the period corresponding to ages 21 through 24. During the first year or two after high school the change scores showed an average increase of about one-third scale point for males and about one-quarter point for females; for the intervals spanning three to six years after high school the mean change scores were somewhat higher for males (about a half scale point), but not for females; and for the longest intervals (up to ten years after high school -- i.e., fourth and fifth follow-ups) the change scores grew smaller. Interestingly, the overall proportions reporting *any* use of alcohol did not change very much from the second follow-up onward; about 83 percent of males reported some use during the past month (combining the "Yes-Yes" and "No-Yes" categories in Part B of Table 4.1), whereas for females the proportions declined slightly from 74 percent to 69 percent.

Let us take a closer look at the transition patterns in current (30-day) use of alcohol, as shown in Table 4.1, Part B, this time considering what proportions of those who had been current drinkers as seniors did *not* report such use at the follow-up, and what proportions made the opposite transition. About three-quarters of the males had been current drinkers at the end of their senior year (computed by combining the "Yes-Yes" and the "Yes-No" categories); at the time of the follow-ups only about one in ten of these males (or 6-9 percent of the total male cases) reported no current alcohol use. About two-thirds of the females had been current drinkers as seniors; at the first and second follow-ups about one in six of them (or 10-11 percent of the total female cases) reported no current use, but the figure increased to more than one in five (or 14 percent of the total female cases) by the fifth follow-up. The opposite transition involves somewhat larger proportions. Of the one-quarter of all males and one-third of all females who were not current drinkers as seniors, just under half were current drinkers as of the first follow-up, while somewhat more than half were current drinkers as of the later follow-ups.

This look at transition patterns leads to two general conclusions. First, we note that the longer intervals between base-year and follow-up show more transitions, both into and out of the category of "current drinker." Of course, we fully expected that longer intervals would involve greater amounts of change; if anything, the differences between intervals do not seem especially large. A second and more interesting conclusion is that among individuals moving from the end of high school to young adulthood, the likelihood of *leaving* the category of current drinker is a great deal smaller than the likelihood of *becoming* a current drinker.

It is worthwhile at this point to acknowledge that it is surely a simplification to speak of "becoming a current drinker" or "initiating," as well as "ceasing to be a current drinker" or "quitting," given that our measures derive from just two one-month intervals and also given that the average respondent reports only three or four occasions of alcohol use during the past month. Clearly, some individuals whose typical monthly frequency is quite low (e.g., one or two times, which would be coded "2" on our seven-point scale) could show up as "ceasing" or "initiating" current alcohol use, when in fact the changes reflect little more than random fluctuation around a low baseline level of use. Consistent with this observation, a look at the base-year and follow-up mean scores for the change pattern groups in Table 4.1 (Part B) shows that those who made a transition in either direction had relatively low mean scores when they were current users; this indicates that some of them were indeed quite close to the threshold defining current use. These simplifications notwithstanding, we think that reporting findings in terms of transitions is a useful adjunct to the analysis of mean change scores; the two sets of results provide complementary perspectives on what are generally consistent patterns of outcomes.

Changes and Transitions in Heavy Drinking

We noted at the outset of this chapter that most high school seniors and young adults drink only once or twice per week, but on these occasions many of them indulge in what most observers would call fairly heavy consumption—five or more drinks in a row. In Table 4.2 we display change scores and transitions in heavy drinking, specifically the number of times during the preceding two weeks in which the respondent had five or more drinks in a row. This heavy use measure, in contrast to the current use measure discussed in the preceding section, is less ambiguously an indicator of problem behavior—behavior which can involve significant risks and which is fairly widely disapproved. (Defining or operationalizing such concepts as "heavy drinking" or "problem drinking" in any comprehensive fashion would be complex, almost surely controversial, and in any case outside the scope of the present monograph. We do, however, see our measure of five or more drinks in a row as a useful *indicator* of such behavior patterns, and we have chosen as a matter of convenience to refer to it as a measure of heavy drinking.) The scale for five or more drinks in a row during the past two weeks consists of the following categories:

1 = None
2 = Once
3 = Twice
4 = Three to five times
5 = Six to nine times
6 = Ten or more times

The mean change scores for the five drinks in a row measure (Part A) show the age-related shifts in heavy drinking noted earlier in this chapter—an increase in the first few years after high school and a decrease thereafter. Turning to the transition patterns (Part B), we see that in each of the five intervals about one third of the males and more than half of the females had not reported heavy drinking during the two weeks preceding either base-year or follow-up (the "No-No" category), whereas about one third of the males but only one sixth to one tenth of the females reported such behavior at both times (the "Yes-Yes" category). In the first two follow-up intervals, those who "initiated" (the "No-Yes" category) outnumbered those who "quit" heavy drinking (the "Yes-No" category); however, across the longer intervals "quitters" outnumbered "initiators."[12]

Gender Differences in Alcohol Use and Changes in Use

The discussions of changes and transitions thus far have already mentioned some important differences between males and females; now we focus more closely on the gender differences. Frequencies of use were distinctly higher among males; moreover, the differences grew larger in the post-high school years, as reflected in both the mean scores and the mean change scores. As Table 4.1, Parts A and B indicate, the fall-off in current drinking during the mid-twenties was a good deal more pronounced among females than among males.

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[12] Here, in particular, we recognize that using a measure covering only the two weeks preceding the survey produces higher rates of both "initiating" and "quitting" than would be the case if we used a longer interval. There is a trade-off involved: the shorter interval is likely to produce greater respondent accuracy, but at the cost of an increase in random error due to time sampling limitations. And, of course, this kind of random variance in individual change scores tends to reduce the total amount of explained variance in multiple regression analyses, as we shall see. But we shall also see that in spite of such limitations, the findings on heavy drinking fit rather well with those for other types of drug use.

The gender differences in current drinking described above are noteworthy, but the differences in instances of heavy drinking, displayed in Table 4.2, are much more pronounced. When we examine the base-year mean scores, keeping in mind that on the 1-6 scale zero heavy drinking (during the past two weeks) is scored as 1.0, we can see that rates of heavy drinking were nearly twice as high among males as among females; for the later follow-ups the differences were even more pronounced. The mean change scores indicate that heavy drinking increased for males during the first one to four years after high school and declined thereafter. For females there was a slight increase in the first year or two after high school, followed by a somewhat larger decline than shown by males.[13]

It is of interest to look at "initiation" into heavy drinking. Just over half of the males as seniors reported no instances of taking five or more drinks in a row during the preceding two weeks, but about one-third of them (i.e., 16 percent of the total male sample) had done so during the two weeks preceding the first follow-up survey—and this rate of initiation showed little change across the remaining four base-year to follow-up intervals. Over 70 percent of females reported no heavy drinking preceding the base-year survey; at the first follow-up about one in five of *these* individuals reported heavy drinking during the preceding two weeks, but that rate of initiation declined to about one in seven at the fifth follow-up.

Of greater interest are rates of "quitting" heavy drinking (keeping in mind again that our two-week measure may in some respects give us an exaggerated estimate of such transitions). Among the nearly half of male seniors who had reported heavy drinking, one-quarter (i.e., 12 percent of all males) at the time of the first follow-up did not report such use, and at the time of the fifth follow-up this rate of quitting had reached 43 percent (or about 21 percent of all males). Among the 29 percent of females who had reported heavy drinking as seniors, 41 percent (i.e., 12 percent of all females) had quit by the time of the first follow-up, and 66 percent (or 19 percent of all females) had done so at the fifth follow-up.

Summarizing these findings on transitions, we see that among young adult males, and even more so among females, the likelihood of quitting soon exceeds the likelihood of initiating heavy drinking. Now we turn to a consideration of some of the events occurring during young adulthood which seem to have an impact on such changes in drinking.

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[13] It should be recalled, however, that five or more drinks in a row have a more profound effect on the typical female than on the typical male, and thus represent a somewhat "heavier" level of drinking for females, on average. To that extent the sex contrasts in overall rates of heavy drinking are exaggerated. If detailed data on amounts of alcohol consumed were combined with measures of body weight, and if other sex differences in metabolism of alcohol were taken into account, one could develop a more refined and less biased sex comparison in heavy drinking. Such refinement is not fully feasible with the available data; fortunately, it also is not necessary, since our primary emphasis in upon *changes* in drug use—including heavy drinking—rather than in overall base levels of use.

BACKGROUND FACTORS LINKED TO ALCOHOL USE

Following the analysis approach which was introduced in Chapter 3, we present the results of a series of correlational and regression analyses in which 30-day alcohol use (Table 4.3) and instances of heavy drinking in the past two weeks (Table 4.4) are linked to our various measures of post-high school role experiences, again with background and demographic factors also entered into the analyses primarily as variables to be controlled.

Gender

The bivariate regression coefficients for gender as a predictor of change in drinking reflect closely the findings reported in the preceding section: females show smaller increases in alcohol use than males do, and they are more likely to decrease heavy drinking. When other background factors are controlled, the multivariate coefficients for gender are slightly larger than the bivariate ones, indicating that the gender differences are not "explainable" in terms of those other factors. However, when living arrangements are added to background factors as predictors, the regression coefficients for gender decline by one-third to one-half, thus indicating that a considerable portion of the overall gender differences may be attributable to higher proportions of females marrying and, more importantly, to pregnancy and motherhood.

Race

The coefficients in Tables 4.3 and 4.4 show greater increases in drinking among Blacks than among Whites, especially the multivariate coefficients which include controls for other background factors. It is important to recognize, however, that these data reflect some convergence between the races; in our samples of high school seniors we found far less reporting of alcohol use among Blacks than among Whites, whereas by the time they were 21 or older the Black-White differences were smaller.

As one example of this convergence, consider the following findings for transitions in 30-day alcohol use derived from Table 4.3 (using procedures parallel to those spelled out in Chapter 3). When they were high school seniors, 54 percent of the Black cases and 26 percent of the White cases reported no use of alcohol during the preceding 30 days. One to ten years later, roughly half of those senior-year "non-users" in each race did report some use during the 30 days preceding the follow-up survey. Thus, if we consider proportions of the total samples, nearly twice as many Blacks as Whites initiated current alcohol use (26 percent versus 14 percent); however, there also were *more than twice* as many Blacks as Whites who remained "abstainers" at both times (28 percent versus 12 percent).

Another and more complex example of convergence between Blacks and Whites involves instances of heavy drinking (occasions of five or more drinks in a row during the two weeks preceding the survey), as displayed in Table 4.4. First we should note that the likelihood of involvement in heavy drinking as seniors was more than twice as high among Whites (about 41 percent) as among Blacks (about 16 percent). Thus here, as in the case of monthly use of alcohol, there was more room for increases among Blacks than among Whites. Nevertheless, smaller percentages of Blacks than Whites initiated such heavy drinking. But when we turn to the other kind of change—quitting—we see that the Whites have a great deal more room for change. Roughly half of the Blacks who had reported heavy drinking as seniors did not report such use during the two weeks preceding the follow-up; however, such individuals represent only eight percent of the total Black samples. Among Whites, fewer than half of those who reported heavy drinking as seniors had quit at follow-up, but they represented about 16 percent of the total sample.

All of the cautions and comments about Black-White differences in cigarette use, discussed in Chapter 3, are relevant also to the differences in alcohol use discussed here. In particular, we should recall that the above discussion is based on regression estimates of the changes that would occur if Blacks and Whites were the same in terms of various background factors such as high school grades, college plans, region, and urbanicity. A close comparison of the bivariate and multivariate coefficients for the change scores (left-hand portion of Tables 4.3 and 4.4) reveals that controls for other background factors actually heighten the bivariate Black-White differences (see also Bachman et al., 1991; Wallace & Bachman, 1991); additional controls for student/work status, living arrangements, marital status, and parenthood show virtually no additional effect.

Region and Urbanicity

Region. There was a tendency for those who lived in the South, as of their senior year, to show smaller than average increases in monthly alcohol use. There was also a tendency for those who lived in the West (as seniors) to show larger than average increases in monthly alcohol use. Interestingly, in both the South and the West alcohol use has tended to be lower than average among high school seniors; thus, the regional differences in change are not attributable in any simple way to different starting points.

Urbanicity. The bivariate coefficient for urbanicity in Table 4.3 shows that monthly alcohol use increases somewhat more among those in large urban areas than among those in rural areas or farms. Controlling for other background factors reduces those differences largely, but not entirely. The transition patterns also show that consistent monthly alcohol use is slightly higher than average in larger urban areas and slightly lower in rural areas.

High School Grades and College Plans

As we have documented in earlier analyses (Bachman et al., 1981; Bachman et al., 1986; Bachman, Schulenberg, O'Malley, & Johnston, 1990; Schulenberg et al., under review), and as can be inferred from the transition data in Tables 4.3 and 4.4, high school seniors with high grades and college expectations were lower than average in alcohol use; moreover, the earlier analyses indicated that this negative relationship was stronger for grades than for college expectations. During the post-high school years these differences diminished, as those who had the higher grades and aspirations during high school showed greater than average increases in alcohol use (Table 4.3) and in heavy drinking (Table 4.4).

A comparison of multivariate regression coefficients reveals that when living arrangements are included in the equation, the predictive contribution of college expectations is diminished substantially, whereas the contribution of high school grades is less affected. As we shall see, the living arrangements associated with college attendance (and, of course, also correlated with earlier college plans) are conducive to increased alcohol use, and we think this accounts for much of the reduction in regression coefficients. But some residual predictive value remains for college expectations, and a good deal remains for grades. Thus we conclude that the negative relationship between alcohol use and educational success in high school grows a good deal weaker in subsequent years, and this is due only partly to changes in living arrangements. In other words, the high achievers in high school who largely avoided alcohol were distinctly less likely to do so in their post-high school years.

Other Control Variables

Base Year. The slight decline in alcohol use during the period covered by the study is reflected in the regression scores for base year. In Table 4.3 the coefficient in the eighth column indicates that about 0.9 percent fewer of those in each successive high school class were monthly drinkers at both base-year and follow-up; also, about 0.5 percent more from each successive class were non-drinkers at both times (ninth column), and nearly 0.4 percent more had stopped monthly drinking (sixth column). There were similar, but smaller, differences in terms of heavy drinking, as shown in the eighth and ninth columns of Table 4.4.

Age at Follow-Up. Recalling that the distinction among follow-ups is a good proxy for age, we can see a number of interesting ways in which alcohol use shifts as young people leave high school and move through the early stages of adulthood. At the most general level, we can see here, as we did in Tables 4.1 and 4.2, that both overall monthly alcohol use and instances of heavy drinking increase after high school and then show some tapering off by the mid-twenties. But beyond that general observation, the two measures of alcohol use show different patterns of change by age.

Because the story is somewhat simpler, let us begin with the measure of instances of heavy or problem drinking, displayed in Table 4.4. The bivariate coefficients (along with the constant) show what we saw earlier—that heavy drinking increases slightly right after high school, but starts to decline by about age 23 and continues to decline in subsequent years. The second and third columns provide new multivariate data showing that this pattern is *not* substantially affected by controls for background factors and student or work status. However, the inclusion of living arrangements, pregnancy, and parenthood (fourth and fifth columns) reduces all of the regression coefficients to non-significance. In other words, it appears that the age-related differences which emerged in heavy drinking were largely the result of age-related differences in marriage, pregnancy, parenthood, and the other aspects of living arrangements which we have included in these analyses.

Turning now to overall frequency of alcohol use (measured during the past month, as shown in Table 4.3), we see a more complex picture. First we should note that the constant is positive and much larger than any of the bivariate coefficients, thus indicating that frequency of alcohol consumption was greater throughout the twenties than during the senior year of high school. This is hardly surprising, since purchase of alcohol becomes legal at age 21 (or before) and consumption (at least in moderation) among adults is widely accepted. Nevertheless, the bivariate data show some curvilinearity with age; starting at about age 25 frequency of use declines slightly. Here again, the second and third columns show that the age relationship is not much affected when background and student/work status are controlled. But when marital status, other living arrangements, pregnancy, and parenthood are added to the picture (fourth and fifth columns), the age relationship is transformed to show a monotonic—nearly linear—positive correlation with age.

Looking at the findings from both tables, we can draw two conclusions. First, it appears that much of the age-related change in alcohol use which occurs during young adulthood can be attributed to living arrangements and related factors, as we spell out in detail below. Second, with such factors held constant, there is a moderate increase *throughout* the twenties in the *occasions* of alcohol use, but at the same time there is no corresponding increase in instances of *heavy* drinking.

STUDENT AND WORK STATUS LINKED TO ALCOHOL USE

Our earlier analyses of changes in drug use one to three years beyond high school showed that measures of student status and employment status explained little variance in drug use changes, once marital status and living arrangements were taken into account. This led to the conclusion that "...differential shifts in drug use correlated with differences in student or employment status are interpreted most parsimoniously as the effects of a more fundamental factor: differences in living/marital arrangements" (Bachman et al., 1984, p. 643). The findings of our present regression analyses, as shown in the multiple correlation coefficients at the bottom of the third column in Tables 4.3 and 4.4, are generally quite compatible with the earlier findings; once again there is very little additional variance explained by student or employment status, above and beyond that explained by marital status, living arrangements, pregnancy, and parenthood.

This initial glance at the "bottom line," in terms of variance explained, might suggest that there is little to be gained from a closer look at the pattern of results for the student and work status measures. Nevertheless, it is instructive to examine the student and work roles as related to alcohol use for two reasons. First, although the *marginal* contribution of these factors may be limited, that does not mean that they are not important; rather, we will argue that they do have important *indirect* impacts via living arrangements, marital status, etc. Second, we will see that one aspect of post-high school occupational experience does show an impact on alcohol use which is independent of our other measures, although the numbers of cases involved are too small to make much of a contribution to total explained variance.

Student Status

We have reported elsewhere that college students show greater than average increases in alcohol use in general, and also in instances of heavy drinking (Johnston et al., 1991). The bivariate coefficients in Tables 4.3 and 4.4 confirm that pattern; the coefficients are positive for full-time students and negative for non-students, with the smaller category of part-time students falling between the other two groups.

When these student status measures are combined with employment status measures and background variables (third column of each table), the resulting multivariate coefficients are smaller than the bivariate ones, a reduction which reflects in part the overlap between actual student *status* and earlier (senior year) college *plans*. But even taking account of this and other overlaps, the student status measures remain statistically significant predictors of change in alcohol use.

When the set of predictors is expanded further to include marital status, living arrangements, pregnancy, and parenthood (as shown in the fifth column of each table), the student status measures are reduced to near-zero (and non-significant) levels. Thus we conclude again that student status does not have impacts upon alcohol use directly; rather, it influences marital status and other aspects of living arrangements which in turn have more direct impacts on alcohol use. Specifically, students are more likely to defer marriage, less likely to continue to live with their parents after high school, more likely to live in dormitories, etc., and all of these factors, as we see below, increase the likelihood of alcohol use.

Work Status

In Chapter 3 we reported that two aspects of employment status showed meaningful relationships with smoking: there were greater than average increases among those in full-time military service and little or no increase among those who described themselves as full-time homemakers. As can be seen in Tables 4.3 and 4.4, the same conclusions can be drawn with respect to alcohol use.

Military Service. The bivariate coefficients show greater than average increases in frequency of alcohol use, and in instances of heavy drinking, among those in full-time military service. Controls for background factors do not diminish these relationships at all, as can be seen by comparing the first and third columns. Further controls for marital status, living arrangements, pregnancy, and parenthood, reduce the coefficients only slightly, thus leading us to conclude that there are aspects of military service which contribute to the increased use of alcohol. This is not to say that increased drinking results from specific work roles associated with the military, or even any more general problems or tensions associated with service in the armed forces. More likely, in our view, is an explanation which focuses on the "after hours" aspects of the lifestyle of the typical young adult in military service. The important point to note is that for this relationship, unlike our findings for student status, the explanation does not lie simply in different proportions married and/or living with parents. Presumably there are factors more specifically linked to the military lifestyle which contribute to increased alcohol use.

It should be pointed out that the transition data in the right-hand portions of Tables 4.3 and 4.4 indicate that the military did not attract greater than average proportions of individuals who were current drinkers or heavy drinkers while in high school. Instead the transition data show larger than average initiation rates among those in military service. Of course, some such initiation may have occurred after high school but before entry into military service; nevertheless, these findings for transition patterns, along with those for overall changes, strongly point to aspects of the military lifestyle as the likely causes of the increased alcohol use.

Homemakers. The negative bivariate coefficient for homemakers in Table 4.3 is twice as large as the overall average increase in frequency of alcohol use, as shown by the constant. In other words, while in general alcohol use increased between the senior year and the time of the follow-up, among full-time homemakers it tended to decrease. Similarly, the coefficient in Table 4.4 indicates an appreciable decline in instances of heavy drinking among the homemakers. In Chapter 3 we noted that the lower smoking levels of homemakers could be attributed almost entirely to other factors, particularly the fact that they are generally married and parents (and/or pregnant). Similarly, the multivariate analyses in this chapter show that most of any "homemaker effect" on changes in alcohol use can also be attributed to these other factors.

Unemployment. There is no evidence in Tables 4.3 and 4.4 that unemployment contributed to increased alcohol use. If anything, the transition data indicate that those in the non-student and not employed category at the time of follow-up were a bit more likely than others to have been non-users of alcohol at both base-year and follow-up.

LIVING ARRANGEMENTS AND MARITAL STATUS LINKED TO ALCOHOL USE

We saw in Chapter 3 that changes in cigarette use were modestly linked with marital status and other living arrangements. Perhaps the key factor limiting the size of such relationships is the fact that cigarette use is highly addictive, and much—perhaps most—post-high school use is the result of earlier acquired dependencies rather than current social environments. In contrast, most alcohol use during high school and young adulthood does not reflect so great a degree of chemical dependency, and thus it may be more susceptible to changes in role responsibilities and social environments. Accordingly, we can expect to see more substantial relationships in this chapter than in the previous one.

Here, as in Chapter 3, the fourth column in each table shows multivariate regression coefficients for marital status and other living arrangements, pregnancy, and parenthood, along with background variables, all as predictors of changes in frequency of drug use—in this chapter current alcohol use (Table 4.3), and instances of heavy drinking (Table 4.4). Also, the fifth column in each table shows regression coefficients when all of these predictors plus the student and work status measures are included as predictors; thus, comparisons between the fourth and fifth columns can tell us something about how the variables in the second and third predictor sets overlap.

Marital Status

As noted earlier, being married is generally the most permanent of the several living arrangements delineated here, as well as the most important in terms of depth and breadth of interpersonal relationships. Married people are more likely than unmarrieds to experience pregnancy and parenthood, with all of the changes and additional responsibilities such roles involve. But even setting those important factors aside (which we are able to do to a considerable extent in these regression analyses), there are still a number of other factors about marriage which might be expected to have an impact on overall alcohol use and especially on instances of heavy drinking. In particular, the mutual caring and commitments associated with marriage, as well as the frequency and closeness of contact, may operate to reduce the likelihood of dangerous behaviors such as instances of heavy drinking. Additionally, young married people may tend to associate with other marrieds rather than with singles, and these new and more "adult" associates may have less time and inclination to use alcohol—especially heavily. For these reasons, and given also our prior research findings (Bachman et al., 1984), we expected to find that overall frequency of alcohol use would be less likely to rise among marrieds than among singles, and that instances of heavy drinking would be likely to decline among the marrieds.

The findings in Tables 4.3 and 4.4 are consistent with our expectations; marriage is associated with a small decline in frequency of current drinking and a larger decline in instances of heavy drinking. The positive constant (0.297) in Table 4.3 indicates that young adults tended to drink more often than they did as high school seniors; however, the bivariate coefficient for marriage is larger and in the opposite direction (-0.392), thus indicating that those who were married actually averaged fewer occasions of alcohol use than when they were seniors. (The net change is only -0.095 on the 7-point scale, but it does stand in clear contrast to the sample as a whole, and particularly to some of the other living arrangements discussed below.) The constant for heavy drinking (-0.036, in Table 4.4) shows a very small decline for the sample as a whole, whereas the bivariate coefficient for marrieds (-0.328) indicates a substantial decrease.

The coefficients in the fourth column of each table show that when the predictors include background, plus pregnancy and parenthood, the multivariate coefficients for marriage are only moderately smaller than the bivariate relationships noted above. As expected, these findings indicate that the overall declines in drinking associated with marriage are partly overlapping with the effects of pregnancy and parenthood; however, the fact that most of the bivariate relationship remains indicates that other aspects of marriage also are important. The introduction of student and employment status as additional predictors, shown in the fifth column of each table, leaves the multivariate coefficients for marriage virtually unchanged; thus we conclude that the "marriage effects" on alcohol use are independent of these factors.

The data on transitions indicate that, with other factors controlled, the marrieds were neither more nor less likely than their classmates to have been drinkers or occasional heavy drinkers during high school (calculated by combining the seventh and ninth columns). Among all cases only 9.0 percent had used alcohol currently in high school and then stopped as of the follow-up, and among marrieds the figure was only slightly higher—11.1 percent. In the case of heavy drinking, however, the impact of marriage was a bit more pronounced—marrieds were both more likely to quit and less likely to initiate at the five or more drinks level.

These findings clearly indicate that distinctive changes in alcohol use *are associated with* marriage, even with a large number of other relevant factors included in the regression equations. Did marriage *cause* those changes? The answer is complicated. Our earlier analysis showed that those who married in the first one to three years after high school had not differed much from their classmates in alcohol use during high school (Bachman et al., 1984), and the present analyses extend that finding to marriage measured at any point during the first ten years after high school. We are thus confident in asserting that there is little evidence that those with different levels of alcohol use *during high school* are differentially predisposed toward marriage. But that is not to say that all of the changes in alcohol use associated with marriage occurred subsequent to marriage. Some earlier exploratory analyses distinguished between follow-up respondents who described themselves as single, engaged, married, or divorced/separated, and the results showed among the engaged what we might describe as a "partial marriage effect" on alcohol use. In other words, it appears that some of the effects of marriage are anticipatory of the formal status of marriage, but subsequent to the sort of commitment involved in engagement. This is an area to be explored further in future analyses, taking account also of the relationship between engagement and cohabiting.

Living Unmarried with a Partner

We saw in Chapter 3 that those who at follow-up reported that they "lived with a partner of the opposite sex" were more likely than average to have been regular smokers before they left high school. As the transition data in Tables 4.3 and 4.4 indicate, they were also more likely to have used alcohol, and to have used it heavily, during the senior year. Whereas about 70 percent of all seniors were current alcohol users (constants in sixth and eighth columns in Table 4.3, combined), the proportion was 81 percent among those who would later be cohabiting (calculated by combining the regression coefficients with the above constants). Similarly, Table 4.4 shows that about 38 percent of all seniors had used alcohol heavily at least once in the previous two weeks, but the figure was 48 percent among those who would later be cohabiting.

Given these initial differences in rates of alcohol use, it is not altogether surprising that fewer of the cohabitants initiated monthly drinking—there were fewer available who had not already begun as seniors. Similarly, the fact that more of the cohabitants quit heavy drinking reflects, at least in part, the fact that there were more who *could* quit (because more had been in the heavy use category as seniors).

When we focus on the change scores we see that those who were cohabiting showed a mean increase of 0.252 (bivariate data) on the monthly alcohol use scale, which is quite close to the overall mean of 0.297 (Table 4.3). The multivariate data indicate that the inclusion of all other predictors does not change matters; the regression coefficients remain small and non-significant. Coupled with the transition data, these results indicate that those in the cohabiting category continued the pattern of somewhat higher than average rates of monthly drinking which had been evident when they were high school seniors.

The change scores for occasions of heavy drinking tell a story which is only slightly different. Cohabitants showed modest decreases, and again the multivariate coefficients are virtually identical to the bivariate ones (Table 4.3). This is consistent with the finding noted above that slightly higher proportions of the cohabitants had quit heavy drinking. But perhaps the most important finding is that, with other factors controlled, we estimate that cohabitation is associated with a 44.7 percent rate of occasional heavy drinking at the time of the follow-up, compared with a rate of 37.8 percent across all cases (seventh and eighth columns in Table 4.4, combined).

Does cohabitation show a partial marriage effect on alcohol use? Given the findings above, that seems to be a hard case to make. Although cohabiting may cause some to curtail their rates of alcohol consumption compared with senior year, it is also clear that many cohabitants remain above average in alcohol use. Perhaps a sharper image of cohabitation effects will emerge from future analyses focusing especially on those cohabitants who describe themselves as engaged.

Living with Parents

The unmarried young adults who continued to live with their parents showed about average levels of change in monthly alcohol use (Table 4.3) and no overall change in rates of occasional heavy drinking (Table 4.4). The transition data show that these individuals were less likely than the other unmarrieds to be current or occasional heavy drinkers at the time of the follow-up (seventh and eighth columns combined).

Living in a Dormitory

By far the largest increases in frequency of alcohol use are associated with living in a dormitory, and this is most pronounced for instances of heavy drinking. Controlling background, pregnancy, and parenthood (fourth column) produces multivariate coefficients which are fully three-quarters as large as the unadjusted bivariate coefficients (first column), thus indicating that the "dormitory effect" is largely independent of these other factors. More important, additional controls for student status (fifth column) leave the coefficients virtually unchanged, thus indicating that dormitory life rather than the student role in general contributed to the rise in drinking (Tables 4.3 and 4.4). The transition data indicate that those who lived in dormitories were somewhat more likely than others to initiate current drinking, half again more likely to initiate occasional heavy drinking, and less likely to quit heavy drinking.

Living Alone, and Other Living Arrangements

In Chapter 3 we found that among those in living arrangements other than those discussed above, there was little difference in smoking patterns between those who described themselves as living alone and those who did not. With respect to alcohol use, however, the distinction turns out to be fairly important.

Living Alone. Among the relatively small numbers of young adults who reported living alone (and not in a dormitory), frequency of current alcohol use increased about twice as much as average (bivariate coefficient, first column in Table 4.3); however, more than half of that difference disappears when background, pregnancy, and parenthood are controlled (fourth column), and further controls for student and work status make little difference (fifth column). Instances of heavy drinking were unchanged, on average, from senior years levels once other factors are controlled (Table 4.4).

Other Living Arrangements. We noted earlier that the living arrangements in this residual category often include a social life similar to that in a dormitory. The findings for alcohol use are certainly consistent with this observation. Increases in frequency of alcohol use, both bivariate and multivariate, are almost as great among those in other living arrangements as among those living in dorms; one difference is that those in the other living arrangements were a bit more likely to have been current drinkers during their senior year (Table 4.3). They were also distinctly more likely to have used alcohol heavily as seniors (Table 4.4); although their *increases* along this dimension are somewhat less pronounced than among those living in dormitories, this is the category of living arrangements which shows the highest proportion of occasional heavy drinkers at the time of follow-up (seventh and eighth columns in Table 4.4, combined).

Further Explorations of Student Status and Living Arrangements

The above comparisons among those living in dormitories and those in other living arrangements involve some confounding of living arrangements with student status. Although this is dealt with to some extent in the regression analyses, we considered it worthwhile to carry out some additional analyses, limited to the first and second follow-ups (i.e., one to four years beyond high school) and focused on full-time students. We found that rates of initiation of heavy drinking (as well as any current alcohol use) were just about equal when comparing full-time students in the "other living arrangements" category with those living in dormitories.

PREGNANCY AND PARENTHOOD LINKED TO ALCOHOL USE

Pregnancy

In Chapter 3 we saw that the one factor which stands out most clearly as linked to changes in smoking is pregnancy; nearly half of the pregnant women who had been regular smokers during high school were able to stop, or at least substantially reduce, their use of cigarettes—although having a pregnant spouse showed no clear effect on smoking behavior of males. If pronounced changes can occur in the face of the strong dependency typically involved in cigarette smoking, then we can reasonably expect substantial changes also in alcohol consumption—a behavior which less often produces such dependency.

Pregnant Females. Table 4.3 reveals that being pregnant is by far the strongest of all the predictors of change in frequency of current alcohol use. The bivariate coefficient is reduced only slightly when taking account of other predictors—in fact, if we combine only the multivariate coefficients for being pregnant, being female, and being married, the result equals the bivariate coefficient almost exactly. (Not all of the pregnant respondents were married, of course, but most were.)

Table 4.4 shows that pregnancy is also a strong predictor of declines in occasions of heavy drinking. In this case the multivariate coefficient is only half as large as the bivariate one, but that is because of overlap with the large multivariate coefficient for marriage.

The transition data in Tables 4.3 and 4.4 show the changes associated with pregnancy when all other predictors are included in the equation. Here, as we did for smoking behaviors in Chapter 3, we have used the regression coefficients to estimate "subgroup data," contrasting women who were pregnant with those who were not, and doing the comparisons for all women and also for just those women who were married. Here, as in Chapter 3, we include both the estimated rates of transition in alcohol use derived from the regression analyses and also the actual rates (i.e., without controls for the other predictors). Here again, as for cigarette use, the estimates generated by the regression analyses, which have the advantage of controlling differences in background and other factors, are fairly closely matched by the actual transition rates.

The fifth column in Table 4.5 indicates that about two-thirds of all women in this analysis had been current users of alcohol as high school seniors—i.e., they had used alcohol at least once during the 30 days preceding the survey. This two-thirds proportion is largely the same for those who later were married or not, pregnant or not. But among these individuals who had been current drinkers during high school, fully two-thirds of those who were pregnant at the follow-up actually reported no alcohol use at all during the preceding 30 days (as shown in the sixth column). In contrast, such quitting occurred for only one out of seven among all non-pregnant women who had been current drinkers as seniors.

Table 4.5 also shows that among the roughly one-third of all women who had not been current drinkers as seniors, about half of those not pregnant at the follow-up had used alcohol during the past 30 days; in contrast, only about one out of six among those pregnant had initiated current drinking.

The findings for occasional heavy drinking are equally dramatic (Table 4.6). Only about 29 percent of all females in this analysis had reported having five or more drinks in a row during the two weeks preceding the senior year survey. Among those who were *not* pregnant at follow-up, about half reported such use preceding the follow-up survey. But among those married and pregnant at the time of the follow-up, an *estimated* 95 percent of all who had done so as seniors reported no such heavy drinking during the preceding two weeks, and the *actual* rate was 98 percent.

An equally sharp contrast can be seen by ignoring use during the senior year and simply focusing on instances of heavy drinking during the two weeks preceding the follow-up. Among all non-pregnant females the rate of heavy drinking was an actual 27.2 percent (and 30.6 percent based on regression estimates), whereas it was an actual 1.4 percent (and an estimated 2.2 percent) among married pregnant females (derived by combining second and third columns in Table 4.6). In other words, among all non-pregnant females, married or not, the likelihood of involvement in occasional heavy drinking during young adulthood is not, on average, very different from that in the senior year of high school. But among married pregnant women, such occasions of heavy drinking are rare. Among the small numbers of pregnant women in our samples who were *not* married, the actual rates of heavy drinking were nearly as low—about five percent (data not shown).

(When faced with figures this low it is appropriate to recall that our samples cannot represent the total population of young adults. The initial sampling limited to high school seniors, plus the further effects of panel attrition, mean that those most likely to be pregnant and abusing alcohol are underrepresented in these panel analyses. That said, it is also worth recalling that these surveys do represent the substantial majority of young adults, and for these individuals the restraint in alcohol use during pregnancy, as reflected in the present findings, is impressive.)

Strictly speaking, the panel analyses summarized above do not demonstrate unambiguously that being pregnant *causes* women to cut down on their alcohol use; the data simply show that those who are pregnant at the time of the follow-up are less likely to drink, and particularly less likely to drink heavily, than when they were seniors in high school. The most simple and straightforward interpretation of this relationship, in our view, is that pregnancy—*including the intention or anticipation of becoming pregnant*—does cause women to cut down and in many cases eliminate their use of alcohol. Moreover, we assume that much of this reduction in drinking is prompted specifically by concern for the possible effects of alcohol on the fetus. Any responsible prenatal care now includes strong cautions against alcohol use, alcohol containers now include a message warning against use by pregnant women, and additional coverage of the issue is widespread in the media. It is of interest in this connection to note that exploratory analyses reported elsewhere (Bachman et al., 1991b) have shown that even during the short interval from 1984 to 1988, the disinclination of pregnant women in our surveys to use alcohol became more pronounced. We see this as evidence that the messages about fetal alcohol syndrome and related risks have been coming through more clearly with each successive year.

Another set of preliminary analyses provides additional evidence for the *causal* impact of pregnancy in the relationships reported here. In earlier analyses we examined frequency of annual alcohol use as well as monthly use. Overall, our findings were sufficiently similar that we judged it unnecessary to continue to examine both measures, and we preferred the monthly measure because it is more current and less subject to recall errors. But with respect to pregnancy, the distinction between the monthly and annual data is particularly relevant. This is because the twelve-month interval for reporting annual use includes a number of months prior to pregnancy. Although some women no doubt reduce, or stop, alcohol use for a period of months during which they are attempting to become pregnant, it also seems likely that many who reported being pregnant at the time of the survey had not deliberately reduced their drinking as early as ten or eleven months prior to the survey. The measure of *current* drinking, by way of contrast, covers a period during which the large majority already were aware of their pregnancy, and some of the rest may have been cutting down on alcohol in anticipation thereof. Thus we should expect that the monthly use data would show pregnancy effects more clearly than the annual use data. The findings in our preliminary analyses were entirely consistent with this line of thinking: the bivariate and multivariate coefficients for pregnancy were consistently larger for the thirty-day alcohol use measure than for the twelve-month measure. In contrast, nearly all of the other predictor variables (the same ones used in the present analyses) showed at least slightly larger coefficients for the annual measure. We attribute this contrast to the fact that none of the other predictors involves such a clear time limitation as pregnancy does.

Males with Pregnant Spouses. As noted above, having a pregnant spouse evidently had little impact on the smoking behavior of males. The same is not true for drinking behavior, however. Table 4.3 indicates that having a pregnant spouse is linked to declines in monthly alcohol use which equal or slightly exceed the declines associated with being married. These changes in current drinking among males with pregnant spouses are not nearly as large as the changes in current use among pregnant women, and we do not see the high quitting rates among males. Nevertheless, it seems clear that overall levels of monthly alcohol use decreased among men whose wives were pregnant.

A more impressive change occurred in instances of heavy drinking, as shown in Table 4.4. Here, men with pregnant wives showed an equally large decline in mean change scores, overall, as the women who were themselves pregnant. The similarity in mean changes, however, does not reflect the gender differences in "starting points" or the extent to which pregnant women stopped heavy drinking entirely. In the case of the pregnant married women, we saw in Table 4.5 that almost none of them drank heavily on any occasion during the two weeks prior to follow-up. Among married males with pregnant spouses, the estimate (derived from Table 4.4) is 31.5 percent—a figure substantially lower than the figure for all males (47.2 percent), but also far above the nearly complete avoidance of heavy drinking by pregnant wives.

In sum, it appears that the men with pregnant wives reduced, but usually did not completely eliminate, their consumption of alcohol. We can imagine a number of reasons for such changes, including shifting social agenda (less attendance at parties and other events where alcohol is served), unwillingness to "drink alone" at home, and perhaps more specifically a desire not to cause an abstaining wife to feel either temptation or resentment. This same sort of reasoning, of course, might lead us to expect men with pregnant spouses to reduce smoking also; the fact that a reduction occurs for alcohol but not cigarettes may be further evidence that the typical smoker has a far greater level of chemical dependence than does the typical drinker. In other words, it is much easier for men with pregnant wives to cut down their drinking than to reduce their smoking.

Parenthood

Married Mothers. The bivariate coefficient in Table 4.3 indicates that married mothers consumed distinctly less alcohol at the time of follow-up than they did as high school seniors, on average. The multivariate coefficient is lower; however, when we combine the multivariate coefficients for being a married mother, for being married in general, and for being a female, the combination is virtually identical to the bivariate coefficient. It thus appears that the controls for other factors do not make much difference. Although rates of "quitting" current drinking are distinctly above average among married mothers, an estimated 63.4 percent of them (compared with an estimated 71.1 percent of all married women) used alcohol to at least some extent during the month before the follow-up. So motherhood is associated with some further reduction in alcohol use, beyond that linked to marriage, but it does not usually lead to complete abstinence. In contrast, only an estimated 30 percent (and an actual 25 percent) of married women who were *pregnant* used any alcohol during the prior month (see Table 4.5).

Single Mothers. The change coefficients for single mothers (Tables 4.3 and 4.4) are also in a negative direction; however, the coefficients are much weaker than those for married mothers (and, due in part to the small number of cases in this category, not statistically significant). The one exception is that single mothers were significantly more likely than average to stop instances of heavy drinking (but here also the shift is not as large as that for married mothers, when we take into account the marriage effect).

Married Fathers. The declines in alcohol use associated with being a married father are about equal to those linked with having a pregnant spouse. Here again we see that the bivariate coefficient is just about equal to the sum of the multivariate coefficients for being a married father, for being married in general, and for being a male. The inclusion of other predictors appears to make little difference.

Single Fathers. We noted in Chapter 3 that single fathers often do not live with their children; also those who became single fathers were more likely than average to have smoked during high school, and to have increased smoking after high school. The findings for alcohol use (Tables 4.3 and 4.4) tell a somewhat similar story; however, most of the coefficients are not very large and all except one fall short of statistical significance (due in part to the small number of single father cases).

INTERPRETING THE OVERLAP AMONG PREDICTOR SETS

The multiple R-squared values shown in the bottom portion of Tables 4.3 and 4.4, contrasted with those in Table 3.3, indicate that changes in drinking are generally more susceptible to post-high school roles and experiences than are changes in smoking.

In particular, marital status, other living arrangements, pregnancy, and parenthood accounted for more than three percent of the variance in monthly smoking change, unique of the other predictors. The comparable figure for changes in instances of heavy alcohol use is nearly two percent of variance.

The contributions of student and work status are more limited, in terms of variance explained. Only a small portion is unique of the background measures, and most of that overlaps with some aspects of marriage, living arrangements, pregnancy, and parenthood. As indicated earlier, we tend to interpret such overlaps as indicating genuine, but indirect, effects. To take the most important example, we think that going to college tends to increase alcohol use largely *because of* the living arrangements which correspond to college attendance. Those who attend college are more likely than their high school classmates to leave their parents' homes soon after graduation; they are also more likely to defer marriage and parenthood; and each of these tends toward greater use of alcohol.

The one exception to the above generalizations involves a different dimension of post-high school experience than college attendance. Being in military service shows an impact on alcohol use which is almost entirely independent from our measures of living arrangements, etc. In fact, of course, the distinctive impact of military service upon alcohol consumption in all likelihood is also a reflection of living arrangements—but ones which were not included in our third predictor set. We do not suppose, in other words, that the *job* of being in the military "drives one to drink." Rather, we think that norms among service men and women have been such as to encourage alcohol consumption. As we will see in the next chapter, recent norms concerning use of illicit drugs among military personnel are quite another matter.

CHAPTER 5. CHANGES IN MARIJUANA USE

We turn now to marijuana, the most widely used illicit drug during recent decades. A majority of the respondents represented in these analyses had used marijuana prior to graduation from high school, thus making it in some sense a "normative" behavior. More than one in three follow-up cases reported marijuana use at least once during the year prior to follow-up (derived from Table 5.1), and close to one in four reported use during the 30 days prior to follow-up (from Table 5.2).

Overall rates of marijuana use have been declining in recent years; however, individual differences in use (including non-use) show a good deal of stability across time—not so high as cigarette use, but much the same as alcohol use. Specifically, after taking account of measurement reliability, we estimate the stability of marijuana use (annual measure) to be about .80-.85 during the first year after high school, and about .90 during subsequent years (derived from O'Malley et al., 1983 and also Bachman et al., 1984). It thus seems clear that much of post-high school marijuana use is influenced by factors already present during high school, as we saw also for alcohol use. Again, it is also true that considerable room remains for change, and we shall see that the factors which seem to influence alcohol use apparently have similar impacts on the use of marijuana. Before examining these influencing factors, however, let us review the nature of changes which have occurred in marijuana use.

PATTERNS OF CHANGE IN MARIJUANA USE

After rising during most of the 1970s, marijuana use declined substantially and steadily throughout the 1980s (Johnston et al., 1991), a decline which we found to be closely linked to changes in perceived risks and disapproval (Bachman, Johnston, O'Malley, & Humphrey, 1988; Bachman, Johnston, & O'Malley, 1990; Johnston, 1985). In other analyses we have demonstrated that the overall changes in marijuana use can be interpreted most parsimoniously as secular trends (historical change) rather than as stable differences from one senior class to another (cohort effects) (O'Malley et al., 1988a). But in the present analyses our focus is in a different sort of change—individual-level shifts in marijuana use, and the extent to which they are linked with post-high school experiences.

We were concerned that the secular trends in marijuana use might distort our findings on individual-level change; however, our regression analysis strategy, which includes year and number of follow-up (i.e., approximate age) among the background control measures, seems to handle the secular trends well. We base that judgment on our finding that results using unadjusted (or "raw") change scores as reported in these analyses are very similar to results we obtained from parallel analyses using change scores which were adjusted to remove secular trends.

In addition to the downward secular trend in marijuana use beginning in 1980, our earlier cohort-sequential analyses revealed age-related shifts, with marijuana use increasing in the first few years after high school and thereafter decreasing (O'Malley et al., 1988a). These age-related changes, of course, are the focus of our present analyses, and we will shortly see that a number of post-high school roles and experiences appear to contribute to the age-related changes in marijuana use.

As noted above, we are satisfied that our regression analyses are not seriously distorted by the secular trends in marijuana use; however, the descriptive data on changes in marijuana use, reported in Tables 5.1 and 5.2, do involve a confounding of age-related changes with the recent more general downward historical trend in marijuana use. An examination of these tables shows that the longer follow-up intervals are based only on the earlier cohorts (classes of 1976-1982), and that these cohorts had higher base-year mean levels of marijuana use. Moreover, the follow-up surveys for the longer intervals took place during the middle to late 1980s, when marijuana use was generally lower across all ages. This combination of factors generated more pronounced declines in marijuana use than we would attribute to age (i.e., age-related factors) alone.

In other words, the age-related shifts in Tables 5.1 and 5.2 are an accurate *description* of the changes in marijuana use experienced by the respondents who provided the data for the present panel analyses; however, our *interpretation* is that these changes reflect the joint effects of two distinctly different phenomena—(1) the recent overall historical decline in marijuana use, which we attribute to broad changes in perceived risks and disapproval (see Bachman et al., 1988; Johnston, 1985); and (2) a separate set of age-related shifts, which are linked to the post-high school experiences examined in the present report. The regression analyses reported later in this chapter were designed to focus exclusively on the age-related shifts, but the descriptions of change in the next section (using Tables 5.1 and 5.2) incorporate both kinds of change.

Gender Differences in Marijuana Use and Changes in Use

The mean change data, shown in Part A of Table 5.1, show that annual marijuana use increased slightly among males during the first several years after high school, and then declined fairly sharply (due in part to the overall downward secular trend in marijuana use noted earlier). Among females, annual use remained at virtually the same level for the first two years and declined thereafter.

Table 5.1, Part B, shows that slightly fewer than half of the male cases in these analyses had senior year reports of some marijuana use during the previous twelve months. At the first follow-up about one-fourth of these high school users had stopped (i.e., reported no use during the previous year), whereas by the fifth follow-up about half of them had stopped. Among the females the senior year reports of annual use were slightly lower (about 40 percent overall), and the "quitting" rates were somewhat higher than those for males.

The data for current (30-day) use, shown in Table 5.2, indicate earlier and more pronounced declines among both males and females (Part A). Among those who had been current users as seniors, about one-third of the males and more of the females had quit at the first follow-up; at the fifth follow-up more than half of the males and fully two-thirds of the females had quit current marijuana use (Part B).

BACKGROUND FACTORS LINKED TO MARIJUANA USE

Again following the analysis approach introduced in Chapter 3, we present results of a series of correlational and regression analyses, now focusing on marijuana use. We noted in the previous chapter our preference for the monthly measure of alcohol use rather than the annual use measure, and some of the same reasoning applies here as well: the current (30-day) measure of marijuana use is more closely linked to the present social environment, and we believe that the current use measure is generally more accurate than the annual use measure. For these reasons, our primary attention will be devoted to changes in current marijuana use, reported in Table 5.3. In contrast to the situation for alcohol use, the variance in monthly marijuana change scores is sufficiently small that we felt it useful to include an annual measure of change as well. We did not, however, carry out the transition analyses for annual use, so the data on this measure, reported in Table 5.4, are limited to change scores.

Gender

The slightly more pronounced declines in marijuana use among females, noted in the preceding section, are reflected also in the bivariate regression coefficients, with the difference more pronounced in the case of annual use (Table 5.4) rather than monthly use (Table 5.3). As we found earlier for alcohol use, controls for other background factors slightly heighten the gender differences, whereas controls for marital status and living arrangements slightly reduce them. In the case of marijuana, however, all of these adjustments are very small indeed.

Race

Combining the bivariate coefficients for race with the constant shows that monthly marijuana use among Whites declined by .16 (on the 7-point scale), whereas among Blacks it declined by only .04 (Table 5.3), and the results for annual use were much the same (Table 5.4). Controls for background, student and employment status, marital status, parenthood, and living arrangements did not diminish the Black-White differences (they were actually heightened, but to only a trivial extent).

Here again, as in the case of alcohol use, the differential change reflects some degree of convergence between Blacks and Whites. As shown in the seventh column of Table 5.3, Blacks were no more likely than Whites to initiate monthly marijuana use after high school. Our regression data do show fewer Blacks than Whites quitting current marijuana use after high school (sixth column, Table 5.3), but that is not surprising given that there were fewer monthly users among the Blacks during high school—in other words fewer who *could* quit. Specifically, the transition data shown in the right-hand portion of Table 5.3 indicate that nearly half again as many White as Black cases had been current marijuana users as seniors (30 percent versus 21 percent), and nearly half in each group had quit (i.e., did not report current marijuana use) at the time of the follow-up, representing about 14 percent of the total White cases and about 9 percent of the total Black cases. These calculations control for all other factors in our regression analyses; however, we noted above that such controls make very little difference in comparing Black and White marijuana use.

Region and Urbanicity

Region. Tables 5.3 and 5.4 show some modest regional differences in change scores which appear attributable largely to differences in senior year proportions of users. The transition data (right-hand portion of Table 5.3) indicate that about 32 percent of cases from the Northeast had been current marijuana users as seniors, and at follow-up about half of them—or 16 percent of the total—had quit. The corresponding figures for those from both the West and North Central regions are 28 percent and 13 percent, suggesting that the greater reduction in use among those in the Northeast reflects their higher starting point. Conversely, senior year use was slightly less common among those from the South (25 percent); here again about half quit (representing 13 percent of the total), but the overall declines were lower because of their lower starting point.

Urbanicity. The bivariate coefficients for urbanicity in Tables 5.3 and 5.4 show that marijuana use declined somewhat more among those who, as seniors, lived in large urban areas compared with those living in rural areas or farms; controlling for other factors tended to enhance these differences. The transition data indicate that current use among seniors was higher in the more urban areas, and here again it appears that the differences in declines largely reflect the differences in initial proportions of users.

High School Grades and College Plans

The findings relating marijuana use to high school grades and college plans show some important parallels with the findings for alcohol use. Seniors with high grades and college plans were less likely than average to use marijuana; during the post-high school years, the differences diminished—but only to some extent. There was, of course, less opportunity for declines among those with high grades because of their lower initial rates of marijuana use. Put another way, those with higher grades in high school were no more likely than average to initiate current marijuana use, but they were less likely to quit simply because they were less likely to be current users in the first place. And in spite of differences in marital status and living arrangements, discussed below, those who had high grades during high school were less likely than average to be current marijuana users at the time of follow-up.

Very similar to the findings for alcohol presented in Chapter 4, multivariate regression coefficients show that when living arrangements are included in the equation, the contribution of college plans to changes in marijuana use is diminished substantially, whereas the contribution of high school grades is affected scarcely at all.

Other Control Variables

Base Year. The secular trend downward in marijuana use throughout the 1980s is reflected in the coefficients in the eighth and ninth columns of Table 5.3, which show that with each succeeding year the likelihood of being a current user at both base-year and follow-up declined (by about 1.4 percent), and the likelihood of being a current user at neither time increased (by about 2.1 percent). In fact, these are linear coefficients across the classes of 1976-1988 and thus fail to capture the non-linear portion of the secular trend in marijuana use. Fortunately, the regression analysis approach used here—i.e., a focus on change scores with controls for date of base-year—seems largely unaffected by the secular trend in marijuana use.

Age at Follow-Up. Here again we can see evidence of the downward secular trend in marijuana use during most of the period studied. The longer follow-up intervals, of course, capture more of that downward trend, and thus show strong negative coefficients. The fact that some of these declines also reflect age-related changes in marital status, living arrangements, etc., is indicated by the reduction in coefficients in the fourth and fifth columns, which include controls for those factors. (It should be noted that marijuana change scores which were adjusted for secular trends largely eliminated the age at follow-up relationships shown in Tables 5.3 and 5.4.)

STUDENT AND WORK STATUS LINKED TO MARIJUANA USE

An early look at the bottom line in terms of variance uniquely explained by student and work status reveals that just under a half percent of variance in *annual* marijuana use change, and about one-quarter percent for the *monthly* change measure, can be explained by the student and work status measures, above and beyond that explained by the set of background measures. When marital status, living arrangements, pregnancy, and parenthood also are controlled, the unique contribution of student and work status is reduced modestly in the case of annual marijuana use, but not in the case of monthly use. Thus, the impacts of student and work status on marijuana use seem to operate largely independently of marital status, living arrangements, etc., unlike the situation with alcohol use (see Chapter 4).

Student Status

We reported in the previous chapter that college students showed greater than average increases in alcohol use, and the bivariate coefficients in Tables 5.3 and 5.4 indicate a similar finding for marijuana. More precisely, full-time college students did not decrease their monthly marijuana use, whereas others did; and the college students slightly increased their annual marijuana use, on average. As was true for alcohol, the bivariate relationships are reduced when we introduce controls for factors such as high school grades and college plans; however, in the case of marijuana the multivariate beta coefficients are so small as to be statistically non-significant. The point made previously, with respect to high school grades, seems applicable also to these differences in marijuana use linked to college attendance: the better high school students (i.e., those destined for college) were less likely to use marijuana in the first place, and the non-users of course were unable to show declines over time.

The finding of little or no effect of student status on marijuana use, after controls for prior educational success (and other background factors), provides some contrast to the findings for alcohol use. On the other hand, for annual marijuana use (Table 5.4) we can see a pattern somewhat similar to that for alcohol use: there is a small relationship that remains after controls for background, but even that completely disappears when marriage, living arrangements, etc., are controlled. In other words, if there is any "college effect" on marijuana use, it is very small (too small to meet our conservative criteria for statistical significance), and it appears to operate entirely indirectly via the different living arrangements associated with being a full-time college student.

Work Status

Here, as in Chapters 3 and 4, we find two aspects of employment status which showed meaningful relationships with drug use: changes in marijuana use departed from average among those in military service and those who identified themselves as full-time homemakers.

Military Service. Although those in military service showed greater than average increases in the use of both cigarettes and alcohol, their experiences with *illicit* drugs are quite another matter. The bivariate coefficients in Tables 5.3 and 5.4 show that marijuana use among those in military service declined three to four times as much as for the panels as a whole. Although further controls slightly damped down the bivariate relationships involving cigarettes and alcohol, the same controls for marital status, living arrangements, pregnancy, and parenthood actually slightly heightened the impact of military service. Here again, the important point is that factors specific to the military lifestyle contribute to sharply reduced marijuana use.

The nature of the reduction can be seen in the transition data shown in the right-hand portion of Table 5.3; those in military service were much less likely to initiate current marijuana use and far more likely to quit. These patterns seem not at all attributable to differences in proportions of current marijuana users during high school; those who would later enter military service were not much more (or less) likely to use marijuana than were their classmates.

It is important to point out that the "quitting" referred to above need not have happened *after* actual entry into military service—in many cases it probably happened after high school but prior to entry into the military. This seems especially likely in recent years, given that the armed forces now have strong anti-(illicit) drug policies backed by drug screening of both recruits and current service personnel.

Homemakers. In many respects the findings for marijuana use are similar to those for alcohol and cigarettes among homemakers. The bivariate coefficients in Tables 5.3 and 5.4 indicate that marijuana use declined two to three times as much among homemakers as among the panels as a whole. However, the multivariate coefficients with background and student status controlled were only about half as large, and once marital status, living arrangements, pregnancy, and parenthood also were controlled, there was no independent "homemaker effect" at all.

Unemployment. Tables 5.3 and 5.4 indicate no relationship at all between unemployment at the time of follow-up and changes in marijuana use.

LIVING ARRANGEMENTS AND MARITAL STATUS LINKED TO MARIJUANA USE

Because the stability levels of marijuana use are quite similar to those for alcohol, and because the frequencies of use are generally lower than those for alcohol, we judge that rather little of the marijuana use in our samples reflects chemical dependency. Thus, like alcohol use and in contrast to cigarette use, we can expect marijuana use to be susceptible to changes in role responsibilities and social environments.

Marital Status

The responsibilities, mutual caring, commitments, intimacy, and "adult" contacts associated with marriage can be expected to reduce not only alcohol use but also the use of illicit drugs—especially when taken for "recreational" purposes. The results in Tables 5.3 and 5.4 show that is indeed the case. The bivariate coefficients (first column) indicate that marijuana use declined two or three times as much among the married as among the unmarried. After controls for background factors, pregnancy, and parenthood, the multivariate beta coefficients (fourth column) are only about half as large as the bivariate eta values, but the effects remain important as well as statistically significant. Adding student and employment status as additional predictors (fifth column) produces virtually no change in the coefficient for marriage, indicating that the effects of marriage are independent of these other aspects of post-high school experience.

Just as was true for alcohol, the marrieds were neither more nor less likely than their classmates to have been current marijuana users as high school seniors, but those who had used were more likely to quit, and those who had not were less likely to initiate.

The comments in Chapter 4 with respect to alcohol apply here as well; at least some of the changes in marijuana use *associated with* marriage may anticipate the formal exchange of vows, but probably occur subsequent to engagement or similar commitment to a future spouse.

Living Unmarried with a Partner

We reported that high school rates of smoking and also drinking were higher than average among those who would later (at the time of follow-up) report living with a partner of the opposite sex. Table 5.3 indicates that the cohabitants were also half again more likely than average to have been current marijuana users during high school; fully 43 percent had reported current (30-day) use of marijuana as seniors, compared with 28 percent of the total cases (derived from the sixth and eighth column of Table 5.3). It seems increasingly clear that senior year drug use is a predictor of later cohabitation (and we will see in the next chapter that cocaine use during high school also was higher among those who would later be cohabitants).

Moreover, and somewhat in contrast to the findings for alcohol, cohabitation is associated with significantly greater than average proportions who initiated current marijuana use. Indeed, among all those who had *not* been current marijuana users at the time of the senior year survey, those who later were cohabiting were more than half again as likely to have reported current marijuana use (from seventh column in Table 5.3).

The overall bivariate change scores associated with cohabitation (first column in Tables 5.3 and 5.4) are very small, most likely because the relatively high senior year starting point limited the increases for this group. But it is of interest to note that the multivariate coefficients, although not statistically significant, are slightly larger than the bivariate ones. In other words, controls for background, as well as other post-high school experiences, do not diminish the relationships between cohabitation and drug use.

(The comments above are based on the *transition* data shown in the right-hand portion of Table 5.3. The *change score* data in the first, fourth, and fifth columns of Tables 5.3 and 5.4 show coefficients for cohabitation which are positive, consistent with the above comments, but also quite small and not statistically significant. We attribute this to the fact that the relatively high marijuana use scores during senior year limited the increases for this group and/or provided greater opportunities to participate in the general decline in marijuana use. Nevertheless, it is of interest to note that the multivariate coefficients are actually slightly larger than the bivariate ones, indicating that controls for background and other post-high school experiences do not diminish the relationships between cohabitation and drug use.)

Living with Parents

Those who were unmarried and continued to live with their parents showed about average levels of change in marijuana use, both before and after controls for other variables (Tables 5.3 and 5.4). The transition data (right-hand portion of Table 5.3) indicate that these individuals were less likely than the other unmarrieds to have been current marijuana users at either the base-year or the follow-up survey.

Living in a Dormitory

We saw in Chapter 4 that alcohol use in general, and heavy drinking in particular, showed much larger than average increases among those living in a dormitory. The same can now be said for marijuana use, as indicated in Tables 5.3 and 5.4. While marijuana use decreased among young adults in general, among those living in dorms use increased (i.e., the positive bivariate coefficients in the tables are about twice as large as the negative constants). Controls for background, pregnancy, and parenthood result in multivariate coefficients which are about half the size of the bivariate coefficients, indicating that an appreciable "dormitory effect" remains after taking account of these other factors. Here, as in Chapter 4, the additional controls for student status leave the coefficients nearly unchanged (comparing fourth and fifth columns), which we take as further evidence that dormitory life rather than the student role in general is what contributes to increased substance use. Consistent with the change score data summarized above, the transition data (right-hand portion of Table 5.3) show that those living in dormitories were significantly more likely to initiate current marijuana use, and significantly less likely to quit.

Living Alone, and Other Living Arrangements

Here, as in Chapter 4, it is important to distinguish those living alone from those in the "other living arrangements" category.

Living Alone. The young adults living alone (and not in a dormitory) did not differ significantly from the sample as a whole in terms of changes in marijuana use.

Other Living Arrangements. The bivariate coefficients indicate that those in this category did not share in the general decline in marijuana use. The multivariate coefficients, particularly after student status also is controlled, show that being in the "other living arrangements" involved just about as much of a (positive) contribution to marijuana use as living in a dormitory. Here again the transition data (right-hand portion of Table 5.3) show greater than average proportions initiating current marijuana use; however, in contrast to the dormitory residents, those in the "other living arrangements" category showed greater than average proportions who had been current marijuana users when they were high school seniors. In other words, the two living arrangements apparently have somewhat similar impacts in terms of *changes* in marijuana use, but the "other living arrangements" category is more likely to include those with a longer history of marijuana use.

Further Explorations of Student Status and Living Arrangements

Here, as in Chapter 4, we found it useful to carry out some additional analyses focused on full-time students as of the first and second follow-ups (i.e., one to four years beyond high school). Just as was true for heavy drinking, we found that initiation of marijuana use (current or annual) was, if anything, somewhat more likely among the full-time students in the "other living arrangements" category than among those in the dormitories.

PREGNANCY AND PARENTHOOD LINKED TO MARIJUANA USE

Pregnancy

In previous chapters we saw that pregnancy stood out as linked to reductions in cigarette use and in alcohol use. It would thus be surprising if pregnancy failed to have some impact also on marijuana use.

Pregnant Females. We reported in Chapter 4 that pregnancy proved to be the strongest of all the predictors of change in frequency of current alcohol use. Pregnancy is also among the strongest predictors of change in current marijuana use, as shown in Table 5.3. The multivariate beta coefficient in the fourth column of the table is nearly two-thirds the size of the bivariate eta coefficient (first column), indicating that much of the "pregnancy effect" is independent of marital status, parenthood, and living arrangements. The beta coefficient in the fifth column is virtually identical with that in the fourth, indicating that the pregnancy effect on marijuana use is entirely independent of student and employment status.

Another finding reported in Chapter 4 is that pregnancy was more strongly linked with current alcohol use than with annual alcohol use, and we argued that this was most likely due to the fact that the twelve-month reporting period would include a number of months prior to pregnancy. A comparison of Tables 5.3 and 5.4 reveals a similar finding for marijuana; although the *bivariate* coefficient for change in annual use is larger than that for monthly use, the multivariate coefficients actually are larger for the monthly change measure. Pregnancy is the only predictor for which that is true; in every other instance (except for a few trivially small and non-significant coefficients) the coefficient is larger for change in annual marijuana use compared with change in current (30-day) use. The fact that the pregnancy relationship runs counter to this general pattern, here as in the case of alcohol use, provides further evidence for our straightforward *causal* interpretation: being pregnant, and probably also preparing for pregnancy, causes young women to eliminate, or at least reduce, their use of marijuana.

Here, as in Chapters 3 and 4, we have taken a closer look at the findings for pregnant women, examining both the transition data derived from the regression analyses with other factors controls, and also the raw or unadjusted transition data. The results for marijuana, displayed in Table 5.5, tell a story similar to that for alcohol. As high school seniors, those who would later be pregnant were just about as likely as their classmates to have been current marijuana users (about one in four); but at the time of the follow-up fully 83 percent of all pregnant women who had been current users as seniors had quit, in contrast to 59 percent of non-pregnant women who had been current users as seniors. In other words, among those who were current marijuana users in high school, only a minority were also current users at the time of the follow-up—but that minority was much smaller among those who were pregnant (17 percent) than among those who were not (41 percent).

Ignoring senior year marijuana use and simply focusing on follow-up use (derived by combining the second and third columns in Table 5.5), we can see that among pregnant married women only 5 percent were current marijuana users, compared with 16 percent of non-pregnant married women; among pregnant non-married women only 9 percent were current marijuana users, compared with 19 percent among other unmarried women. These contrasts for current marijuana use are not as dramatic as those for heavy drinking shown in Table 4.6, but they are roughly comparable to those for current (30-day) alcohol use (although the rates for current marijuana use are much lower than those for current alcohol use across all four groups of women).

Here again, as we found in Chapters 3 and 4, the actual transition rates shown in Table 5.5 are fairly similar to the estimated rates of transition with other factors included in the equation. The main difference is that the actual rates of use at follow-up are somewhat lower than the estimates because the estimates include controls for base-year and length of follow-up interval, and these controls to some extent damp the overall downward secular trend in marijuana use. The generally close correspondence between actual transition rates and those which adjust for other factors is another indication that the "pregnancy effect" is largely independent of other factors.

Males with Pregnant Spouses. Having a pregnant spouse was linked to declines in monthly alcohol use which equalled or slightly exceeded the declines associated with being married (see Chapter 4). Table 5.3 shows a similar pattern; the bivariate coefficient for pregnant spouse is slightly larger than that for marriage, and the multivariate coefficients for pregnant spouse are almost as large as those for marriage. The pregnant spouse coefficients are not large enough to be statistically significant, however, because of the small numbers of males with pregnant spouses (in part, because the pregnancy question was included only in 1984 and subsequent follow-ups).

In connection with our discussion contrasting the data in Tables 5.3 and 5.4 for pregnant women, it is of interest to note that with respect to changes in *annual* marijuana use, shown in Table 5.4, the change coefficients (both bivariate and multivariate) are virtually identical for being a pregnant female or having a pregnant spouse; with respect to *current* marijuana use the bivariate change coefficients also are fairly similar, but the multivariate ones are twice as large for pregnancy as for having a pregnant spouse. An examination of the rest of Tables 5.3 and 5.4 reveals some gender differences in parenthood, discussed below, which may provide a bit of help in sorting out these complexities; it appears that among males the impact of being a (married) father edges out the impact of having a pregnant spouse, whereas among females pregnancy is somewhat more important than already being a (married) mother. We will return to these matters a little later.

Parenthood

Married Mothers. The bivariate coefficient in the first column of Table 5.3 indicates that being a married mother is associated with greater-than-average declines in current marijuana use, but the multivariate coefficients indicate that much of this decline reflects overlapping factors, most obviously marriage, and sometimes pregnancy. As noted above, the impact of motherhood shows up much more clearly for annual marijuana use (see Table 5.4) than for the current use measure.

Single Mothers. All the coefficients for single mothers are weak and non-significant. Current marijuana use shows no change which is linked with being a single mother; annual use shows a small (but non-significant) negative change.

Married Fathers. Married fathers showed substantially larger-than-average declines in both current and annual marijuana use. The multivariate coefficients are roughly half the size of the bivariate ones, indicating overlap with other factors (such as marriage, and sometimes having a pregnant spouse). The transition data in Table 5.3 show that married fathers, like married mothers, are significantly less likely than average to initiate current marijuana use.

Single Fathers. In contrast to married fatherhood, single fatherhood showed no relationship with changes in marijuana use. The single fathers, however, were distinctly more likely than average to have been current marijuana users during senior year, and were also more likely to be current users at the time of the follow-up (right-hand portion of Table 5.3).

INTERPRETING OVERLAPS AND EXPLAINED VARIANCE

The multiple R-squared values in the bottom portion of Tables 5.3 and 5.4, when contrasted with those in Tables 3.3, 4.3, and 4.4, indicate that changes in marijuana use are somewhat more predictable from post-high school roles and experiences than are changes in smoking, but they are distinctly less predictable than changes in alcohol use.

As noted throughout this chapter, many of the relationships with changes in marijuana use are similar to (if weaker than) those with changes in alcohol use. One important exception is that military service is associated with increases in alcohol use but decreases in marijuana use.

Another more general distinction between the findings for the two drugs is that in the case of marijuana the changes associated with student and employment status overlap very little with those involving family status and living arrangements. Military service is the only important aspect of employment status associated with marijuana change; the relationship is not at all diminished by controls for background, and if anything it appears to be slightly enhanced after controls for family status and living arrangements. Student status, on the other hand, shows no significant relationship with marijuana change once background factors (including high school grades and college plans) are controlled. The one remaining area of overlap between the employment status measure and the measures of living arrangements and family status involves full-time homemakers. As we found for alcohol, the greater decreases in use by homemakers are most readily interpreted in terms of their marital and parental status.

A final point is in order concerning the rather low amounts of explained variance shown in Tables 5.3 and 5.4. As mentioned earlier in this report, our primary focus here is on the *patterns* of change associated with certain post-high school experiences; we have relatively little interest in total amounts of explained variance, except as they help us understand patterns of overlap among sets of predictors. The experiences associated with the most pronounced changes (declines) in marijuana use—most notably military service, and also pregnancy and fatherhood—involve relatively small portions of our total cases, and thus can contribute rather little to overall explained variance. But there are substantial change scores and transition patterns associated with these experiences, and we judge those figures to be much more relevant for present purposes than the overall portions of variance explained.

CHAPTER 6. CHANGES IN COCAINE USE

Cocaine is perceived as riskier than marijuana, more widely disapproved, more expensive, and less widely used. Nevertheless, substantial minorities of our respondents have used this drug sometime during their lifetime. At the time of follow-up about one in six reported some use during the previous year (Table 6.1), and nearly half of those cases (7 percent of the total follow-up cases) also reported cocaine use during the previous 30 days (Table 6.2).

PATTERNS OF CHANGE IN COCAINE USE

Unlike marijuana use, cocaine use did not decline significantly until after the 1986 survey; thereafter it has declined sharply, again linked to changes in perceived risk and disapproval (Bachman, Johnston, & O'Malley, 1990; Johnston et al., 1991). In other analyses we have demonstrated that the substantial changes in marijuana use can most parsimoniously be interpreted as secular trends (historical change) rather than as stable differences from one senior class to another (cohort effects) (O'Malley et al., 1988a; 1988b). We also interpret the recent decline in cocaine use, which has been observed for both high school seniors and young adults (Johnston et al., 1991), as a secular trend.

Here, as was the case for marijuana use, we were concerned that secular trends might distort our findings on individual-level change; fortunately, our regression analysis strategy of including year and number of follow-up (i.e., approximate age) as control measures seems to handle the secular trends (based on obtaining similar findings using cocaine change scores adjusted to remove secular trends).

Our earlier cohort-sequential analyses showed substantial age-related changes in cocaine use, with proportions of annual users roughly doubling during the first three years after high school and then showing little in the way of further change (O'Malley et al., 1988a; 1988b; see also Johnston et al., 1991). This rise in cocaine use during the first few years after high school is a much more dramatic age-related shift than we have seen with any of the other drugs examined here, or with any of the other illicit drugs examined in the earlier analyses (O'Malley et al., 1988a; 1988b). We shall see in this chapter that our present set of panel cases shows a somewhat longer age-related rise, extending through the third follow-up, followed by some decreases (relatively speaking) in the later follow-ups. We will also see that the later *decreases* seem entirely attributable to changes in family status and living arrangements; in other words, with those factors controlled, a strong age-related rise in cocaine use remains. One possible explanation for this age-related shift involves the high cost of cocaine in powdered form (very little of the use examined here involves the lower-cost crack cocaine); use became more affordable as young people moved into early adulthood, and also as they moved more into contact with other young adults who could afford to be cocaine users.

It should be noted that the data on cocaine use examined here are different in several ways from the data explored in some of our other analyses. The cohort sequential analyses designed to isolate age, period, and cohort effects (O'Malley et al., 1988a), and also our annual reports of trends in drug use (e.g., Johnston et al., 1991) incorporate adjustments for panel attrition which are neither practicable nor necessary for the present examination of impacts of post-high school experiences. Additionally, those other analyses focus exclusively on prevalence measures, whereas our present analyses of *change* scores take account also of frequency of use (although the transition scores do not). Finally, we should emphasize that the recent dramatic decline in cocaine use became clearly evident only in the 1987 and subsequent surveys, and most of the data examined here predate those declines. In sum, the descriptions of changes provided here cannot fully reflect the recent dramatic declines in cocaine use, nor do they correspond precisely to some of our other reports of change; their primary value is as a backdrop for the multivariate analyses which follow.

Gender Differences in Cocaine Use and Changes in Use

The mean use data, presented in Part A of Tables 6.1 and 6.2, show that males were more likely than females to use cocaine both during the senior year and during the follow-ups, and males also had larger average increases in use. The data also show that the largest increases in current (30-day) cocaine use were not reached until the fourth follow-up among males, whereas among females the peak increases occurred at the third follow-up.

The transition data in Part B of Table 6.1 (the "No-No" category, total) show that about three-quarters of the male cases, and five-sixths of the female cases, had used no cocaine in either the year preceding the base-year or the year preceding follow-up survey. As seniors, fewer than 11 percent of the males and fewer than 9 percent of the females had used cocaine during the past year (Table 6.1), and fewer than 5 percent of males and just about 3 percent of females had been current cocaine users (Table 6.2). Males were about half again as likely as females to initiate cocaine use at either annual or current levels, with the highest rates of initiation evident in the middle follow-up years.

BACKGROUND FACTORS LINKED TO COCAINE USE

Once more following the analysis approach introduced in Chapter 3, we present results of a series of correlational and regression analyses, this time focusing on cocaine use. Here, as in the analyses of marijuana use in Chapter 5, we focus primarily on the current (30-day) measure as the more closely linked to the present social environment (see Table 6.3); however, the variance in current cocaine use is even lower than that for current marijuana use, and thus we again extend our analysis to include changes in annual use (Table 6.4).

Gender

The findings here are in many respects similar to those for both alcohol and marijuana. The bivariate coefficients are again positive for males and negative for females; with respect to cocaine, females showed smaller increases than did males. The multivariate coefficients with background controlled are similar to the bivariate ones, but here again when living arrangements and family status are included the gender coefficients are reduced.

Race

The change scores for current cocaine use (Table 6.3) show no racial differences in either bivariate or multivariate coefficients. The transition data (right-hand portion of Table 6.3), however, show that Blacks were more likely than Whites to be current cocaine users at *neither* base-year nor follow-up surveys. The data for annual cocaine use (Table 6.4) show smaller average increases for Blacks than for Whites, but this modest difference is not large enough to be statistically significant.

Region and Urbanicity

Region. The transition data in Table 6.3 indicate that current cocaine use during senior year was above average in the Northeast and West, and below average in the South and North Central regions. The change score data in Table 6.4 indicate that rates of annual cocaine use increased most in the Northeast, and least in the South.

Urbanicity. The transition data in Table 6.3 indicate that current cocaine use during both senior year and follow-ups was slightly higher in the more urban areas; moreover the urban areas showed higher rates of both initiation and quitting. Table 6.4 shows that annual cocaine use showed larger than average increases in the more urban areas.

High School Grades and College Plans

Cocaine use, like nearly all other types of drug use, has been negatively correlated with the grades and college plans of high school seniors (Bachman et al., 1981; 1986; Johnston et al., 1991). Thus here, as in the case of marijuana use, those with better grades and college plans during high school had less opportunities for declines in cocaine use. It is, therefore, not surprising that the transition data in Table 6.3 show that those with higher grades in high school were slightly less likely to quit current cocaine use; however, the data also show that they were less likely to initiate such use.

The change score coefficients for current cocaine use (Table 6.3) are too small to be statistically significant, but Table 6.4 shows some interesting distinctions between high school grades and college plans as they relate to changes in annual cocaine use. The bivariate coefficients (first column) show that those who planned for college were slightly more likely than average to show increases in annual cocaine use, whereas those with high grades were slightly *less* likely to show increases. When these two variables are used as joint predictors, along with other background factors (second column), the multivariate coefficients are larger than the bivariate ones; it appears that those who did plan for college but had relatively poor grades were particularly likely to increase annual cocaine use. Looking ahead, we note that actual attendance at college did not seem to contribute to increases in cocaine use; however, when post-high school student status is included among the multivariate predictors (third column), the coefficient for college *plans* is slightly increased. Although all of these coefficients and shifts are quite subtle, they consistently fit with the interpretation that overaspiration and/or underachievement may be linked with increased likelihood of cocaine use. It thus may be useful in some future analyses to focus specifically on how post-high school attainments match senior year college plans, and how such matches (or mismatches) relate to changes in drug use.

Other Control Variables

Base Year. It appears that here, as in the case of marijuana use, the coefficients for base year reflect primarily secular trends. The supplemental analyses carried out with change scores adjusted to remove secular trends greatly reduced these coefficients.

Age at Follow-Up. We noted earlier in this chapter that cocaine use showed the largest increases in the middle follow-ups, as indicated by the bivariate coefficients (first column) in Tables 6.3 and 6.4. Specifically, the coefficients in Table 6.4 (combined with the constant) show that average increases in annual cocaine use, above senior year levels, were about .12 at the first follow-up, .24 at the second, .28 at the third, .26 at the fourth, and .21 at the fifth. If these changes, and differences in changes, seem rather small given that a seven-point scale is involved, it should be recalled that large majorities of both seniors and young adults reported no use of cocaine at all; therefore, all such changes are attributable to small proportions of the total cases.

Multivariate analyses which include family status and living arrangements among the predictors (fourth and fifth columns) yield a slightly different pattern of age-related changes. Specifically, with all predictors included (fifth column), the mean increases in annual cocaine use across the five follow-up intervals are estimated as .15, .24, .25., .23, and .25 (respectively). It thus appears that when the age-related changes tied to marriage, pregnancy, parenthood, and other living arrangements are taken into account, the remaining age-related pattern is an increase for about the first four years after high school and then a continuation at about that level.

The age-related changes described above apparently had little to do with secular trends in cocaine use. Although the supplemental analyses with change scores adjusted for secular trends removed most of the *base-year* differences, as noted above, they had very little impact on the *age-related* differences. If anything, the multivariate age-related pattern described above appeared slightly stronger when the secular-trend-adjusted data were used; the estimates are .11, .21, .24, .24, and .26.

STUDENT AND WORK STATUS LINKED TO COCAINE USE

Student Status

Tables 6.3 and 6.4 indicate no meaningful relationship between student status and changes in either current or annual cocaine use.

Work Status

As in previous chapters, we can see two aspects of the employment status variable which showed meaningful relationships with drug use: military service, and being a full-time homemaker.

Military Service. The bivariate coefficients in Tables 6.3 and 6.4 indicate that those in military service showed no increase in cocaine use over the generally low levels in high school (i.e., the negative coefficients balance out the positive constants for post-high school change). Here, as for marijuana use, the multivariate controls for family status and living arrangements heightened the coefficients indicating impact of military service. In general, drug use is more likely than average to increase among young adults who are unmarried and not living with parents, as is true for most in military service. The fact that cocaine use did not rise among those in the military, whereas it rose significantly among civilians, seems directly attributable to military service, and/or the anticipation thereof.

The transition data (right-hand portion of Table 6.3) indicate that those in military service had virtually zero likelihood of initiating current cocaine use. These are estimates, of course, and statistically hold constant a number of factors (such as living arrangements, noted above) which in fact differ between civilians and those in the service, on average. Interestingly, additional computations examining actual rates rather than estimates revealed only 2.6 percent of males in military service had initiated current cocaine use, compared with 7.2 percent of all other males; and only an additional 0.6 percent of males in the military reported current cocaine use at both base-year and follow-up, compared with 1.6 percent of all other males. For the small numbers of female cases in military service, the rates were even lower, and distinctly lower than those for civilian females.

Homemakers. The findings here parallel those for the other drugs discussed in previous chapters. Those in the full-time homemaker category, like those in military service, did not show increases in cocaine use, on average; however, the multivariate coefficients indicate that the "homemaker effect" is largely interpretable as the effects of marriage, pregnancy, and parenthood.

LIVING ARRANGEMENTS AND MARITAL STATUS LINKED TO COCAINE USE

Marital Status

Tables 6.3 and 6.4 indicate that those who were married were less likely than most others to increase their use of cocaine, and the multivariate coefficients indicate that the "marriage effect" for this drug is not diminished when other factors are controlled.

Here again, as we saw for alcohol and marijuana, those who were married were neither more nor less likely than average to have been current cocaine users as high school seniors (right-hand portion of Table 6.3); however, they were less likely to initiate current cocaine use. Again we note that some of these marriage effects may be anticipatory.

Living with a Partner

We saw in previous chapters that those who would be cohabiting at the time of a follow-up had above-average rates of cigarette, alcohol, and marijuana use when they were high school seniors. As Table 6.3 indicates, cocaine use can now be added to that list; indeed, those who would later be cohabiting were twice as likely as other seniors to be current cocaine users. Those who were cohabiting also were about twice as likely as others to have "initiated" current cocaine use, and twice as likely to be current users at the time of follow-up.

These transition rates are much more pronounced for current cocaine use than those we observed (Table 5.3) for marijuana use. Correspondingly, we also see larger coefficients for cocaine change scores (Tables 6.3 and 6.4) than we saw for marijuana change scores (Tables 5.3 and 5.4). The bivariate coefficients for change indicate that increases in cocaine use among cohabitants were more than double the average; the multivariate coefficients are almost as large, indicating practically no overlap with the other predictors.

Whatever the underlying dynamics, it seems clear that at least some of those who explore the alternative lifestyle of cohabitation also show greater than average willingness to experiment with illicit drugs, including more serious ones such as cocaine. That said, we should also emphasize that the large majority of cohabitants (82 percent) were *not* current cocaine users at either senior year or follow-up (derived from last column of Table 6.3).

Living with Parents

As was true for marijuana use, those who were unmarried and continued to live with their parents showed about average levels of change in cocaine use, both before and after controls for other variables (Tables 6.3 and 6.4).

Living in a Dormitory

Previous chapters reported that those living in dormitories showed above average increases in alcohol use, heavy drinking, and marijuana use. The same is *not*, however, the case for cocaine use. The bivariate coefficient for annual cocaine use (Table 6.4) is actually slightly negative, the transition coefficients for current use are virtually zero (Table 6.3), and so are all of the multivariate coefficients relating dormitory residence to cocaine use. Apparently it is one thing for dorm students to involve themselves in heavy drinking and marijuana use, but quite another matter to get into cocaine use.

Living Alone, and Other Living Arrangements

Living Alone. Here again we see no significant differences from the sample as a whole, especially once background and other factors are controlled in the multivariate analyses.

Other Living Arrangements. The findings for this group show some similarity to those for the cohabitants, except that those in the "other living arrangements" category did not report above average rates of cocaine use when they were high school seniors. But they did show distinctly larger than average increases in both current and annual cocaine use; also, the multivariate coefficients are nearly the same as the bivariate ones, indicating virtually no overlap with other predictors. The transition data (right-hand portion of Table 6.3) indicate greater than average proportions initiating current cocaine use.

Further Explorations of Student Status and Living Arrangements

Once again, as in Chapters 4 and 5, we carried out additional analyses focused on those who were full-time students at the time of the first and second follow-ups (one to four years beyond high school). Students living in dormitories showed rates of initiating current or annual cocaine use that were nearly as low as the rates of students living with parents; however, students in "other living arrangements" showed initiation rates nearly twice as high.

PREGNANCY AND PARENTHOOD LINKED TO COCAINE USE

Pregnancy

Pregnancy was linked with reductions in cigarette use, alcohol use, and marijuana use, and we see here that it is also linked with reductions in cocaine use.

Pregnant Females. The bivariate coefficient in Table 6.3 indicates that pregnant women reported reduced levels of current cocaine use compared with senior year of high school (whereas females in general reported increased use). The multivariate coefficients for change in current use are about two-thirds the size of the bivariate coefficient; although they are slightly higher than those for marriage, the coefficients linking pregnancy to change scores fall short of statistical significance (due to the relatively small numbers of pregnant women, and the more limited time interval during which pregnancy was measured). The transition data (right-hand portion of Table 6.3) do include statistically significant differences, indicating that pregnant women were less likely to initiate current cocaine use.

Here, as in previous chapters, the current data provide a clearer indication of a "pregnancy effect" than do the twelve-month data. Table 6.4 shows coefficients for changes in annual cocaine use are smaller for pregnancy than for marriage (and again the pregnancy coefficient falls short of being statistically significant).

Table 6.5 provides a closer look at findings for pregnant women, examining transitions in current cocaine use as estimated from regression analyses with other factors controlled, compared with the raw or unadjusted transition data. This table, like the counterparts in previous chapters, shows a generally close correspondence between the estimates and the actual data, suggesting that "pregnancy effects" on cocaine use, like those on other drug use, are largely independent of other factors. As the table shows, among the small numbers of women who had been current cocaine users as seniors, most were not current users at time of follow-up; while this is true for all categories in Table 6.5, the quitting rates are most pronounced, approaching 100 percent, among those who were pregnant. Similarly, although very few women initiated current cocaine use, the rates were near zero for pregnant women (compared with about 5 percent among non-pregnant women).

If we ignore senior year cocaine use and simply focus on the follow-up, we can see (by combining the second and third columns in Table 6.5) that among married women 0.7 percent of those pregnant were actual current cocaine users, compared with 2.9 percent of those not pregnant. Similarly, among the unmarried the rates were 1.8 percent for those pregnant, compared with 6.5 percent for those not pregnant. And among all women (i.e., with no control for marital status), the difference is more pronounced: 0.8 percent versus 5.4 percent. These differences involve relatively small numbers of cases, and thus must be treated with some caution. We have reported them not because we think the estimates are at all precise, but rather because they help to make clear the orders of magnitudes involved. Current cocaine use is relatively rare among young women in general, more rare among those who are married, and *very* rare among those who are pregnant. Although the numbers of cases are too small to make a large impact in terms of explained variance, we still consider it noteworthy that current cocaine use is only about one-sixth as frequent among pregnant women, compared with all other women in young adulthood.

Males with Pregnant Spouses. Having a pregnant spouse was associated with no statistically significant changes or transitions in either current or annual cocaine use. The coefficients for change in Tables 6.3 and 6.4 are negative, but trivially small—especially after controls for marriage, parenthood, and other factors.

Parenthood

Married Mothers and Fathers. There are changes in cocaine use associated with being a married mother or a married father; the negative effect on current use is too small to be statistically significant (Table 6.3), but it does reach significance in the case of annual use (Table 6.4). It appears that those who were married and parents at the time of follow-up showed no increase in annual cocaine use, on average, compared with use levels as high school seniors (the combined negative coefficients for marriage and married parenthood just about balance out the positive constant in Table 6.4).

Single Mothers. The cocaine use coefficients for single mothers, like the marijuana coefficients reported in Chapter 5, are all weak and non-significant.

Single Fathers. The coefficients for changes in cocaine use among single fathers are positive, indicating that those individuals increased cocaine use more than average. Because of the small numbers of cases, however, the *change* coefficients in Tables 6.3 and 6.4 fall short of statistical significance, and thus we must be cautious in our interpretations. On the other hand, the coefficients for *transitions* indicate that single fathers were significantly more likely than other males to initiate current cocaine use (Table 6.3).

INTERPRETING OVERLAPS AND EXPLAINED VARIANCE

The comments in Chapter 5 concerning low amounts of explained variance certainly apply here as well. There was much less cocaine use than marijuana use among young adults, and especially among high school seniors. Accordingly, we might expect amounts of explained variance to be even lower for changes in cocaine use than for changes in marijuana use. In fact, that is only partially true. The various background control measures explain much less variance in cocaine change, compared with marijuana change; however, the student and work status differences in explained variance are not nearly so large; and the set of variables including living arrangements and marital and parental status actually account for more explained variance in cocaine change than in marijuana change.

We noted in Chapter 5 that changes in marijuana use associated with student and employment status overlap very little with those involving family status and living arrangements. The summaries of explained variance in the bottom portion of Tables 6.3 and 6.4 indicate that the same is true for changes in cocaine use. Here, as we found also for marijuana, military service is the only important aspect of employment status associated with change; controlling background factors in no way diminishes that relationship; and additional controls for family status and living arrangements actually increase the negative coefficient for military service. Once more, as found for alcohol and marijuana, the category of full-time homemaker does reflect an overlap; the homemakers' relatively low use of cocaine seems largely interpretable in terms of their marital and parental status.

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CHAPTER 7. SUMMARY OF IMPACTS OF POST-HIGH SCHOOL ROLES AND EXPERIENCES ON DRUG USE

The preceding four chapters each focused on a single drug, examining ways in which patterns of substance use changed during the post-high school years, and how those changes were linked to background factors, to student and work status, to marital status and living arrangements, and to pregnancy and parenthood. Chapter 3 focused on cigarettes, Chapter 4 on alcohol, Chapter 5 on marijuana, and Chapter 6 on cocaine. One reason for treating these four substances separately was that each has shown different patterns of overall change in recent years; secular trends and age-related changes have been distinctive across the four drugs, and only cigarette use has shown clear cohort differences. A second reason for separate treatment was that each drug showed somewhat different individual-level patterns of change related to post-high school roles and experiences.

In this chapter the primary focus is no longer on any single drug, but rather upon the post-high school roles and experiences we have been examining. We will summarize key findings from Chapters 3 through 6, with a view toward understanding the ways in which student life, employment, marriage, pregnancy, parenthood, and other aspects of living arrangements lead to changes in the use of various drugs.

We must emphasize that we are summarizing the findings from analyses which incorporate our *assumptions* about causal impacts. The fact that we have panel data stretching from the senior year of high school to points one, two, three, and up to ten years later provides great opportunities for linking changes in role statuses and responsibilities with changes in substance use. Our analysis strategy follows our assumption that, in the main, these changes in roles and experiences contribute, directly and/or indirectly, to changes in the levels of post-high school drug use. But we readily acknowledge that these causal assumptions are simplifications, and there are interesting and important exceptions where the changes in drug use may precede and contribute to the changes in role status. We are aware of some such exceptions and note them specifically (e.g., we have found declines in heavy drinking corresponding to becoming engaged, thus indicating that a portion of the change in drinking linked with marriage is anticipatory). It is, therefore, useful at the outset of this summary chapter to stress again that correlational analyses do not prove causation—a caveat which holds even for those correlational analyses which employ panel data spanning a number of years. But having said that, we will add that panel data, by pointing to correspondences between one kind of change and another, do help us narrow the range of plausible causal interpretations. It is from that kind of perspective that we summarize in this chapter our explorations of the "plausible impacts" of post-high school roles and experiences upon drug use.

IMPACTS OF STUDENT AND WORK STATUS ON USE OF CIGARETTES, ALCOHOL, MARIJUANA, AND COCAINE

As reported in Chapter 2, student status and work status are closely interrelated, simply because the two roles compete for finite amounts of time and energy. Thus, relatively few full-time college students are also full-time employees (and, of course, vice versa). Moreover, student status is clearly (and negatively) related to marital status, and to other living arrangements (with students more likely to leave parents' homes). Accordingly, to the extent that marital status and living arrangements have direct impacts on drug use, student status is likely to have at least indirect impacts. This interpretation of the dominant causal sequence led to our decision in this monograph to focus first on student status and work status, and then on a broad range of living arrangements and related role responsibilities.

Impacts of Student Status

The first thing to be said is that the impacts of college attendance on drug use are both more and less than cross-sectional data would lead one to believe—more in the case of alcohol, and less in the case of cigarettes.

College students are far less likely than their age-mates to be daily cigarette smokers, but this has relatively little to do with their experiences while in college. Our cross-sectional analyses (e.g., Johnston et al., 1991) show that among young adults in the first four years beyond high school, full-time college students are less than half as likely as their age-mates to be daily cigarette smokers, and less than a third as likely to smoke at the half pack or more rate. Our panel analyses reported here and earlier (Bachman et al., 1984; see also Bachman, Johnston, & O'Malley, 1978) show a clear sequence of events suggesting that the reason most college students do not smoke is because they never became regular daily smokers while they were in secondary school. Thus college attendance is related to large and important differences in *levels* of smoking, but little in the way of post-high school *changes* in smoking.

Additional panel analyses (Bachman, Schulenberg, O'Malley, & Johnston, 1990; Schulenberg et al., under review) support the following interpretation of the relationship: Those who are academically successful in high school (and earlier) are unlikely to become smokers during adolescence, and these same individuals are also likely (later) to go to college. Because cigarette smoking is such a highly addictive behavior (as reflected in its high rates of stability), these differences in smoking rates linked to earlier educational success persist during the college years (and beyond). In other words, smoking may reflect educational accomplishments, to be sure, but accomplishments which occurred well in advance of college attendance.

Our analyses of change scores also revealed that being a full-time student was associated with slightly lower than average increases in smoking (Table 3.3). This is not surprising, given that most of the changes in smoking involved higher rates of use by those already involved in smoking—and, of course, many fewer of the college students had been smokers during high school.

When it comes to alcohol use, the impact of college attendance is quite another matter. Here, indeed, the effects are greater than cross-sectional data would suggest. A cross-sectional look at young people one to four years after high school shows that college students are slightly more likely than age-mates to be occasional heavy drinkers, while slightly less likely to be daily drinkers (Johnston et al., 1991); however, these fairly modest *cross-sectional* differences belie substantially higher than average *increases* among the college students (Tables 4.3 and 4.4). Alcohol use, like cigarette use, is distinctly lower than average among high school seniors who plan to complete four years of college; accordingly, the relatively large increases in drinking among full-time college students mostly have the effect of "closing the gap" or even "reversing the gap" in the case of binge drinking.

The increased use of alcohol among college students seems due primarily to the living arrangements which are likely to accompany that status compared with their age-mates; full-time students are much less likely to be married, but more likely to have left their parents' homes. Both of these aspects of lifestyle contribute to increased alcohol use. We thus conclude that being a full-time college student tends to increase alcohol use, and that these effects are largely indirect via the impact that student status has upon marital status and other aspects of living arrangements.

Cross-sectional data show that high school seniors expecting to complete college are distinctly less likely than their age-mates to use either marijuana or cocaine, and the same is also true for full-time college students (Johnston et al., 1991). Our panel analyses of change, however, showed no "college effect" in the case of cocaine use (Tables 6.3 and 6.4). The analyses of change in marijuana use suggested the possibility of a small college effect that fell short of statistical significance; any such effect appeared to operate indirectly via the living arrangements associated with being a college student (Tables 5.3 and 5.4).

Impacts of Work Status

Analyses of post-high school work status are complicated, unavoidably, by the fact that some individuals are not in the work force due to their status as students or homemakers, whereas others may be in the work force but currently unemployed. Our efforts to deal with these problems of classification led us to make a number of distinctions, but clear and consistent changes in drug use were found for only two categories: those who were full-time homemakers and those in military service.

The multivariate analyses led us to interpret the declines (or lower than average increases) in drug use among full-time homemakers as little more than a reflection of the fact that nearly all were married, many were parents, and some were pregnant at the time of the follow-up survey. In other words, there is little evidence to suggest any separate "homemaker effect" above and beyond the effects of marriage and parenthood. (And since we consider that marriage and parenthood generally lead to the full-time homemaker status, rather than vice versa, we do *not* interpret these relationships as indicating any sort of "indirect effect" of homemaker status.)

It is important to note that we found no convincing evidence of changes in drug use attributable to unemployment. This is not to say that no such effects occur, but rather to indicate that any such effects were not strong enough, and/or not consistent enough in direction, to be discernible in this type of analysis.

Military Service. Serving in the armed forces does relate strongly to changes in drug use; the relationships are largely independent of either background or other role statuses and responsibilities; and the changes are in opposite directions for licit versus illicit substances.

Those in military service showed greater than average increases in cigarette smoking, alcohol use, and instances of heavy drinking (Tables 3.3, 4.3, and 4.4). Since controls for marital status, living arrangements, pregnancy, and parenthood had little effect on this relationships, we conclude that aspects specific to military service contribute to these increases in smoking and drinking.

Those who would later enter military service were about average in their senior year use of marijuana; however, in follow-up surveys those in the military were far more likely to have quit, and less likely than others to have initiated marijuana use (Tables 5.3 and 5.4). Relatively few high school seniors were cocaine users, but those who entered the military were much more likely than others to quit; more importantly, those in military service were much less likely to have initiated cocaine use (Tables 6.3 and 6.4). We recognize that here some of the changes may well have been anticipatory, given the current strong anti-(illicit) drug policies in the armed forces.

IMPACTS OF LIVING ARRANGEMENTS AND MARITAL STATUS ON USE OF CIGARETTES, ALCOHOL, MARIJUANA, AND COCAINE

Much of the drug use in early adulthood is heavily affected by social contacts. It thus came as no surprise that changes in marital status and in other aspects of living arrangements during the post-high school years are linked to changes in drug use. Specifically, usage levels for alcohol, marijuana, and cocaine are responsive to living arrangements; moreover, the patterns of change are largely similar across these several categories of drug use. Cigarette use is the clear exception, showing fewer and generally smaller effects; we think this low responsiveness to living arrangements reflects the fact that a high proportion of regular smokers are nicotine dependent by the time they leave high school or soon afterward.

Impacts of Marital Status

Being married, and perhaps also the anticipation of being married, contribute to reduced drug use. Being married involves new sets of responsibilities, mutual caring, commitments, intimacy, and increased "adult" contacts, all of which seem likely to inhibit the "recreational" use of illicit drugs, as well as heavy use of alcohol. It also means less time spent in bars and at parties frequented by singles—the "singles scene" where a lot of smoking, drinking, and illicit drug use tend to take place. We found some evidence that being married may inhibit cigarette smoking, but these effects are much smaller than those for the other drugs.

It is important to note that other related factors such as pregnancy and parenthood also contribute to reduced drug use, but the regression analyses controlling for these factors clearly suggest that marital status itself plays an important role in limiting the use of drugs.

It is worth repeating here a point introduced in Chapter 4; our findings clearly indicate that distinctive changes in drug use *are associated with* marriage, even after controls for many other relevant factors, but it is less clear how and to what extent marriage is the *direct cause* of such changes. We do know that there is little evidence that those with different levels of drug use during high school are differentially predisposed toward marriage; however, we also know that some reductions in drug use are associated with becoming engaged, and thus precede marriage. It is beyond the scope of the present analyses to try to sort out the extent to which the "marriage effects" documented are "anticipatory" rather than subsequent to actual marriage. It may be that such a sorting out is less important than the more general finding that the total effects of marriage, including some factors which often precede the actual exchange of vows, are generally in the direction of constraining drug use and abuse.

Impacts of Living Unmarried with a Partner

Whereas different levels of drug use during high school were not very predictive of marriage, as noted above, we did find that those who were cohabiting at the time of follow-up were distinctly more likely than average to have been drug users during high school; specifically, as seniors they were somewhat more likely to have used alcohol (including occasional heavy use), they were half again as likely to have been regular cigarette smokers, they were also half again as likely to have been current marijuana users, and they were twice as likely to have been current cocaine users.

At the time of follow-up, those who were cohabiting were also more likely than average to have increased their rates of cigarette smoking, their use of marijuana, and their use of cocaine. That said, it should be noted that the majority of cohabitants were not, and had not been as seniors, daily cigarette smokers or current (i.e., monthly) users of either marijuana or cocaine. In other words, although cohabitants were more likely than average to be users of each of these three substances, only a minority did so.

Whereas cohabitants were more likely than average to increase their use of cigarettes, marijuana, and cocaine, that was not the case for alcohol. Alcohol use in general showed only average, or slightly lower than average, levels of increase among the cohabitants, and instances of heavy drinking showed greater than average decreases (which still left the cohabitants with slightly higher than average proportions of occasional heavy drinkers). The important difference between alcohol use and the use of the other three drugs is that the majority of both seniors and young adults use alcohol, and many occasionally drink heavily. Thus a much larger proportion

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of the cohabitants are involved, including many who were not involved with the other more "deviant" (at least from a statistical standpoint) drug using behaviors.

This mix of findings for the cohabitants suggests lines for future analyses which would go well beyond the scope of those reported here. It may well be the case that several subgroups of cohabitants could be identified. Certainly one basis for sorting out subgroups might be alcohol use; some cohabitants decreased their alcohol use (thus showing a similarity to many respondents who married), and we suspect that such individuals were relatively unlikely to initiate or increase use of the other substances. Another basis for defining subgroups would be to focus on those cohabitants who did initiate or increase use of marijuana and/or cocaine. An alternative subclassification strategy would focus on cohabitation itself, considering the different ways in which cohabitation fits in the life course of many contemporary young adults. For some it seems to be a rather "normal" precursor to marriage, for others it may be a longer-term alternative, and for still others it may be a limited involvement with little in the way of mutual commitment. Thus, survey-derived "case histories" of cohabitation followed by a period of being single may be, on average, quite different from those in which cohabitation is followed by marriage (and perhaps parenthood). In particular, we suspect that the sequences of drug use associated with these two patterns would tend to be different.

Impacts of Living with Parents

During a period when many of their age-mates undergo large, often profound, changes in living arrangements, those young adults who continue to live with their parents are much less likely to experience dramatic changes in a whole range of interpersonal contacts and social activities. It is, therefore, not surprising that this living arrangement is associated with only average levels of change in all four categories of substance use, both bivariately and after all other factors are controlled. In other words, these individuals are not exposed to the additional peer pressure and lack of constraints that often accompanies life in dormitories or apartments, but neither are they involved in the commitments and responsibilities of marriage, and the result seems to be that their drug change patterns fall neatly in between. It is, however, noteworthy that those who continued to live with parents for some years after high school were slightly lower than average in senior year, and also follow-up, levels of drug use.

Impacts of Living in a Dormitory

Those in dormitories, like college students in general, were much less likely to have been cigarette smokers in high school, and also less likely to smoke during young adulthood. On the other hand, alcohol use, and especially instances of heavy drinking, showed substantial increases among those living in dormitories; comparisons of bivariate and multivariate coefficients indicated that roughly three-quarters of these "dormitory effects" on drinking are independent of the other factors examined here. Also, whereas marijuana use decreased among young adults in general, it failed to do so among those in dorms; here we found that about half of the dormitory effect is independent of other factors examined. With respect to cocaine, however, there was no such effect at all. As we noted in Chapter 6, apparently it is one thing for dorm students to involve themselves in heavy drinking and (perhaps) marijuana use, but quite another matter to get into cocaine use.

Impacts of Living Alone, and Other Living Arrangements

Among those young adults not in one of the four above living arrangements (i.e., living with a spouse, with a partner, with parents, or in a dormitory), we distinguished between those who specified that they were living alone versus those in all other living arrangements (with the latter including those living in apartments or houses shared with several others, as well as military personnel living in barracks or in shared off-base housing).

Those living alone showed positive bivariate coefficients for changes in each of the drug use measures. For marijuana use and cocaine use, the bivariate coefficients were quite small, and controls for background and other living arrangements led to still smaller (and non-significant) coefficients. For cigarette use and monthly alcohol use, however, the bivariate coefficients were somewhat larger; controls for background and other living arrangements led to smaller (but significant) multivariate coefficients; additional controls for student and employment status led to slightly lower coefficients (below the significance threshold). It thus appears that those living alone were a bit more likely than average to increase, or less likely to reduce, their use of various substances, but that such changes were at least partly the result of other factors which covary with living alone.

Those in the "other living arrangements" category showed average increases in alcohol use and instances of heavy drinking which were roughly comparable to the increases associated with living in a dorm; there was also a close correspondence between these two categories in terms of changes in marijuana use (after other factors were controlled). This similarity in findings is consistent with our view that for many young adults these other living arrangements involve a social life somewhat similar to that in a dormitory. The other living arrangements category includes many non-students, of course, and this may account for the larger percentage of cigarette smokers; still, the *changes* in smoking, after controlling all other factors, were only slightly higher than for those in dorms.

The great majority of all respondents reported no use of cocaine, and this was true also of those in the other living arrangements category. Still, those in this category did show greater than average increases in cocaine use, as well as above average levels of initiation of use. It is in this respect that at least a subset of those in other living arrangements seem most clearly different from those living in dormitories.

IMPACTS OF PREGNANCY AND PARENTHOOD ON USE OF CIGARETTES, ALCOHOL, MARIJUANA, AND COCAINE

As noted in Chapter 3, we treated pregnancy status and parenthood status as two distinct dimensions (two sets of dummy variables) in these analyses, while recognizing that they are closely interrelated. In particular, any effects of pregnancy on drug use which led to more

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permanent changes in drug use behavior were incorporated within any "parenthood effects"—in other words, the two dimensions were not easily disentangled within our present analysis format. Future analyses, which do not attempt to examine many other factors simultaneously, may focus specifically on *patterns* across several follow-ups, tracking the transitions into (initial) pregnancy and then into parenthood. Such analyses would be well suited to documenting the extent to which drug changes during pregnancy show lasting effects.

Impacts of Pregnancy

Being pregnant is associated with lower levels across all dimensions of drug use examined here. Particularly noteworthy is the fact that pregnant women were about twice as likely as all others to cease daily or half-pack smoking, and they were the only subgroup to show a net reduction in smoking between senior year and follow-up. Alcohol use showed even more dramatic reductions, marijuana use showed sharp declines, and cocaine use was lower than average.

As we discussed in Chapter 2, our panel analyses do not demonstrate unambiguously that being pregnant *causes* women to cut down on their use of drugs; the findings simply show that those pregnant at the time of follow-up were less likely to use each of the drugs than they were as seniors in high school. Our interpretation of these relationships is straightforward and parsimonious: pregnancy—including the intention or anticipation of becoming pregnant—does cause women to cut down and in many cases eliminate their use of cigarettes, alcohol, marijuana, and (for the much smaller numbers initially involved) cocaine. Certainly prenatal care now includes strong cautions against alcohol use, and usually cigarette use and other drug use as well, and there is additional widespread coverage of these issues in the media.

One of the important additional findings in these analyses is that the annual drug use measures, while in most respects showing slightly stronger relationships than the monthly use measures, show slightly weaker relationships with respect to pregnancy. Since pregnancy (and often also any plans or anticipation of pregnancy) would not cover the full twelve-month interval reflected in the annual drug use measures, it is understandable that the pregnancy effects would be weaker ("noisier") when annual data are used.

The story for husbands with pregnant spouses is less dramatic and more complicated. They showed no reduction in use of cigarettes (at either bivariate or multivariate levels of analysis). They did, however, show substantial reductions in overall alcohol use, although they were much less likely than pregnant women to quit entirely, and their reductions in instances of heavy drinking were fully as large as those for pregnant women. There are indications that having a pregnant spouse inhibited males' use of marijuana to some extent, and perhaps also cocaine; however, these effects were relatively small and (given very limited numbers for this subgroup) short of statistical significance. Whether these several reductions in use reflect changes undertaken in anticipation of the pregnancy, anticipatory socialization to the more responsible role status of being a parent, a more direct impact from the change in spousal behavior, and/or changes in social activities associated with the pregnancy remains to be determined.

In sum, pregnancy had dramatic effects on the full spectrum of drug use we examined—at least with respect to pregnant women themselves. With respect to spouses, the effects did not extend to cigarette use, but did show up quite strongly with respect to instances of heavy drinking.

Impacts of Parenthood

As noted in earlier chapters, exploratory analyses found that most relationships examined in this report were similar for males and females; in other words, although there were some important sex differences (e.g., more males than females reporting instances of taking five drinks in a row), most patterns of relationship were essentially parallel across sexes. However, distinctions between sexes proved to be quite important when analyzing pregnancy, and perhaps in part because of the pregnancy-related differences it was also necessary to distinguish between males and females in their roles as parents. Furthermore, we found it necessary to distinguish between parents who were married and those who were not.

Married Mothers. Being a married mother was associated with lower drug use across the board. Some of the bivariate differences were reduced by controls, which of course would be expected given that the (more general) effects of being married tend to run in the same direction. Still, the evidence strongly suggests that parenthood itself made additional contributions to reducing drug use among married mothers.

Married Fathers. Much the same can be said for married fathers with respect to alcohol use, marijuana use, and cocaine use. The one clear exception is cigarette use which, if anything, showed slightly greater than average increases among married fathers (although this difference fell short of statistical significance).

Single Mothers. Single mothers were more likely than average to have been cigarette users during high school, and the analyses indicate that parenthood made little difference in their smoking behavior. They were not much different from average in their senior year use of alcohol, marijuana, or cocaine; here again there is no evidence to suggest that parenthood contributed to changes in levels of use. Thus the findings for single mothers stand in clear contrast to those for married mothers, presumably because the two kinds of motherhood experience (or other correlated aspects of lifestyle) are clearly different.

Single Fathers. The differences in lifestyle between single and married fathers are in most cases more pronounced than is true for single versus married mothers, if only because most single fathers do not live with their children. Certainly with respect to drug use our findings show pronounced differences between single and married fathers. Single fathers were distinctly more likely than other males to have been daily cigarette smokers during high school, and to have continued afterward; among those who were not daily users in high school, single fathers

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were also more likely to have initiated daily or half-pack smoking during the post-high school years. The findings for other drugs also showed tendencies for higher use during high school, and afterward, among those who became unmarried fathers; however, many of those relationships fell short of statistical significance (given the small numbers of single father cases). As noted above, since relatively few single fathers live with their children, we suspect that any changes in drug use probably do not result directly from parenthood *per se*, but rather from other factors associated with being a single father.

INTERPRETING OVERLAPS AND EXPLAINED VARIANCE

Comparisons Among Drugs

We have observed large differences from one drug to another, and it may be useful to recall some of the most important of these differences.

Cigarette Use. Current users of cigarettes are in the minority among both high school seniors and young adults. Indeed, the majority of all cases examined in these analyses reported no current (i.e., past month) use of cigarettes preceding either the senior year or the follow-up survey. It follows, then, that all of the change measures examined here are based on relatively limited proportions of the total sample. The amounts of change are further limited because smoking is a highly stable behavior, much more so than any of the other forms of drug use examined here.

Although many fewer young adults smoke than drink, the numbers of cigarettes consumed vastly outstrips the numbers of drinks consumed. Whereas most alcohol users do so on a less than daily basis, and illicit drug use is typically far less frequent than that, the typical young adult smoker lights up ten or more times per day. These high levels of use, and the relatively high stability of smoking across long time intervals, testify to the high degree of nicotine dependence involved.

Further evidence that this behavior is the result of nicotine dependence can be found in the relative resistance of smoking to change as a function of the lifestyle and role experiences examined here. There are some changes, of course—most notably the declines in smoking among pregnant women. Still, the present findings show cigarette use to be far less responsive to changes in role responsibilities and social environment than is alcohol use or illicit drug use.

Alcohol Use. Of the four drugs studied in this report, only alcohol was used on a current basis by the large majority of seniors and young adults. In contrast to cigarette use, most of the alcohol use reported here is occasional rather than frequent and does not reflect dependency, and it can and often does change in response to shifts in roles and experiences.

Marijuana Use. Although marijuana declined substantially in its popularity during most of the period covered by this report, it was still by far the most widely used of the illicit drugs.

More than one third of the cases in these analyses reported some use of marijuana during the month preceding either the senior year survey, the follow-up survey, or both. The use of marijuana is, on average, a good deal less frequent than is the case for alcohol, and patterns of use do change in response to changing roles and experiences.

Cocaine Use. The use of this drug was far less frequent than the use of marijuana during the period of this study; accordingly, there was much less in the way of overall change, and generally fewer clear links with the post-high school roles and experiences examined here. Nevertheless, we did find a number of important shifts, mostly consistent with those found for marijuana and alcohol.

Overlapping Impacts of Different Roles and Experiences

Student status is linked with a wide range of other experiences; specifically, most high school graduates who become full-time college students defer marriage and parenthood, and many of them also leave their parents' homes somewhat earlier than their age-mates who do not go to college. Of course, a willingness to defer marriage, and perhaps to leave one's hometown and parents' home, may itself play a causal role and help some young people to decide in favor of college; however, we think that the primary causal sequence is that the desire for further education is the dominant consideration, whereas decisions about living arrangements and the timing of marriage follow largely as consequences of more fundamental decisions about college.

Being unmarried and leaving the parental home are factors associated with greater than average increases (or less than average decreases) in alcohol use, as well as use of illicit drugs. Our findings suggest that the (positive) impact of student status on alcohol use, including heavy drinking, are entirely indirect via these living arrangements, because when the living arrangements (plus marital and parental status) are included in the regression equations, the impact of student status is reduced essentially to zero. In other words, the effects of student status on alcohol use overlap completely with the effects of these other factors. Our interpretation of these findings is that student status does indeed contribute to increased alcohol use, but only *indirectly* via the living arrangements, marital status, and parental status which generally result from being a college student.

The patterns described above for alcohol use do not emerge clearly for marijuana use or cocaine use. In the case of marijuana use, bivariate relationships indicate that marijuana use did not decline among students, whereas it did among most non-students; however, controls for background factors accounted for virtually all of the positive relationship between student status and changes in marijuana use.

Another set of overlapping relationships involves full-time homemakers; their relatively low use of each of the four drugs can be explained parsimoniously as reflecting primarily their marital and parental status.

One other important set of relationships indicates that being in military service tends to increase smoking and drinking, whereas it tends to decrease illicit drug use. Here there is very little overlap with other factors, suggesting that these impacts are almost entirely independent of the effects of marriage, parenthood, etc.

CONCLUSIONS: CAN POST-HIGH SCHOOL ROLES AND EXPERIENCES EXPLAIN AGE-RELATED CHANGES IN DRUG USE?

In Chapter 1 we raised the following question: Can the typical age-related changes in drug use during young adulthood be explained in terms of the important role transitions which occur during that period? The most accurate answer to that question is: Yes, in part, depending on the drug. We have presented a good deal of evidence that several post-high school experiences are closely linked to changes in drug use, and we believe that the links occur mostly because the new roles influence drug use, rather than vice versa.

Of course, other factors also contribute to the age-related changes in drug use observed in the present samples. In the case of the illicit drugs marijuana and cocaine, important secular trends (especially the decline in marijuana use) complicate the picture; indeed, the notion of "typical age-related changes" is not very applicable to these drugs, because the picture keeps changing—sometimes quite rapidly. Nevertheless, our findings are not inconsistent with the general notion that illicit drug use, including the use of both marijuana and cocaine, declines during young adulthood with age, and the assumption of adulthood roles and responsibilities.

In the case of the licit substances, cigarettes and alcohol, age-related changes do follow fairly consistent patterns from one cohort to another, and thus can be called typical. Surely among the chief contributors to these patterns are age-normed legal restrictions. During high school it is illegal for young people to purchase cigarettes and alcohol, and it is often inconvenient to use them, especially while in school. During the first years of young adulthood the legal restrictions disappear, the inconveniences are sharply reduced, and one consequence seems to be the prompt rise in usage levels. But very shortly the averages trend downward again, most notably with respect to heavy drinking. It seems clear that these declines each year beyond age 21 or 22 reflect the growing proportions assuming new adult responsibilities and relationships, especially marriage, pregnancy, and parenthood.

Cigarette use is highly addictive and thus shows only limited change, as noted earlier in this chapter and detailed in Chapter 3. Still, an examination of the regression coefficients in Table 3.3 indicates that more than half of the modest decline in average cigarette use from age 21-22 to age 27-28 is explainable in terms of the post-high school roles and experiences examined here (based on contrasting the second and fifth column of regression coefficients for Follow-Up 2 versus Follow-Up 5).

Changes in alcohol use are much more pronounced. Current (i.e., 30-day) alcohol use rates rise appreciably above senior year rates for the first three or four years after high school;

thereafter they steadily decline, but still remain well above the senior year levels (as indicated by the regression coefficients plus the constant in Table 4.3). In contrast, instances of heavy drinking increase very slightly in the first several years, and then decline well below senior year levels (as can be derived from Table 4.4). The important part of the story, however, is what happens when post-high school roles and experiences are controlled. The declines in current alcohol use and heavy drinking are virtually eliminated. Put differently, the regression findings summarized in Tables 4.3 and 4.4 clearly indicate that the age-related declines in alcohol use are explainable in terms of post-high school experiences such as marriage, pregnancy, and parenthood.

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TABLES

Table 2.1
Background Characteristics Measured in Base Year
By Sex and Endpoint of BY-FU Interval
(Entries are Proportions of the Sample)

	Target Sample*	Males and Females (combined data) Obtained Sample					
		FU1	FU2	FU3	FU4	FU5	Total
Modal Age:	18	19-20	21-22	23-24	25-26	27-28	
Class years included:	76-88	76-88	76-86	76-84	76-82	76-80	76-88
Interval length (years)**	0.000	1.478	3.470	5.465	7.458	9.439	4.395
Number of cases (Wtd.)	22024	17809	14310	11169	8233	5547	57,069
Sex							
Male	.483	.453	.456	.459	.457	.458	.456
Female	.517	.547	.544	.541	.543	.542	.544
Race							
White	.781	.808	.820	.830	.843	.853	.825
Black	.120	.102	.099	.098	.092	.087	.098
All Others	.099	.090	.081	.072	.065	.060	.077
Region							
Northeast	.233	.233	.237	.240	.238	.238	.237
North Central	.291	.302	.309	.312	.318	.324	.310
South	.313	.304	.299	.299	.296	.291	.299
West	.163	.160	.155	.150	.149	.148	.154
Urbanicity							
Farm	4.9	5.1	5.5	5.9	6.3	6.6	5.7
Country	7.1	7.3	7.6	7.7	8.0	7.9	7.6
Non-SMSA	19.1	19.4	20.0	19.8	19.5	18.8	19.6
SMSA:Non Self Rep.	43.0	42.9	42.1	41.6	41.8	42.0	42.2
SMSA: Self-Rep	25.9	25.2	24.9	25.0	24.4	24.6	24.9
Average Grades in H.S. (D=1, A=9)	5.751	5.916	5.934	5.932	5.955	5.975	5.935
Plans to Graduate from a 4-Year College Program							
Definitely Won't	23.0	21.9	23.3	24.7	25.7	27.3	23.9
Probably Won't	17.8	17.1	17.6	17.8	17.9	18.0	17.5
Probably Will	22.8	23.0	22.9	22.9	23.3	22.8	23.0
Definitely Will	36.4	38.1	36.2	34.6	33.1	31.9	35.6
Mean Parental Education (10=Low,60=High)	35.049	35.376	34.930	34.505	34.284	34.023	34.808

* Target sample for first follow-up, classes of 1976-1988 (combined).

**Mean years from base-year to follow-up.

Table 2.1, cont.
Background Characteristics Measured in Base Year by Sex and Endpoint of BY-FU Interval
(Entries are Proportions of the Sample)

	Males							Females						
	Target Sample*	Obtained Sample						Target Sample*	Obtained Sample					
		FU1	FU2	FU3	FU4	FU5	Total		FU1	FU2	FU3	FU4	FU5	Total
Modal Age:	18	19-20	21-22	23-24	25-26	27-28		18	19-20	21-22	23-24	25-26	27-28	
Class years included:	76-88	76-88	76-86	76-84	76-82	76-80	76-88	76-88	76-88	76-86	76-84	76-82	76-80	76-88
Interval length (years)**	0.000	1.478	3.471	5.466	7.457	9.438	4.404	0.000	1.478	3.470	5.464	7.459	9.441	4.387
Number of cases (Wtd.)	10,632	8,077	6,523	5,124	3,762	2,539	26,026	11,391	9,732	7,787	6,045	4,471	3,008	31,043
Sex														
Male	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Female	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Race														
White	.790	.823	.834	.848	.857	.866	.840	.773	.797	.808	.815	.830	.842	.812
Black	.107	.085	.083	.079	.073	.069	.080	.131	.117	.113	.115	.108	.101	.113
All Others	.103	.092	.083	.073	.070	.065	.080	.096	.086	.079	.070	.062	.057	.075
Region														
Northeast	.235	.236	.238	.240	.238	.231	.237	.232	.231	.237	.239	.237	.243	.236
North Central	.293	.303	.314	.313	.314	.322	.311	.289	.302	.305	.311	.321	.326	.309
South	.309	.299	.295	.297	.298	.294	.297	.317	.308	.303	.300	.294	.289	.301
West	.164	.162	.154	.150	.149	.154	.155	.162	.159	.156	.149	.148	.143	.153
Urbanicity														
Farm	5.5	5.7	6.3	6.6	7.0	7.4	6.4	4.3	4.6	4.7	5.2	5.7	6.0	5.0
Country	7.2	7.6	7.5	7.7	7.8	7.4	7.6	6.9	7.1	7.6	7.7	8.2	8.4	7.6
Non-SMSA	18.1	18.4	18.2	17.6	17.4	16.5	17.9	20.0	20.3	21.5	21.7	21.3	20.8	21.1
SMSA:Non Self Rep.	43.5	43.8	43.2	43.0	43.5	43.7	43.4	42.6	42.3	41.2	40.4	40.3	40.6	41.2
SMSA: Self-Rep	25.6	24.6	24.7	25.0	24.4	25.0	24.7	26.2	25.7	25.1	24.9	24.5	24.2	25.1
Average Grades in H.S. (D=1, A=9)	5.449	5.635	5.637	5.649	5.650	5.657	5.643	6.029	6.146	6.180	6.168	6.209	6.240	6.177
Plans to Graduate from a 4-Year College Program														
Definitely Won't	21.3	20.1	21.3	22.0	23.1	23.7	21.6	24.6	23.3	25.0	26.9	27.9	30.4	25.8
Probably Won't	18.9	17.5	18.2	18.2	18.4	18.8	18.1	16.8	16.7	17.1	17.5	17.4	17.4	17.1
Probably Will	24.2	24.5	24.4	24.1	24.1	24.4	24.3	21.5	21.7	21.6	21.9	22.7	21.4	21.8
Definitely Will	35.6	37.9	36.1	35.7	34.4	33.1	36.1	37.2	38.2	36.3	33.7	32.0	30.8	35.2
Mean Parental Education (10=Low,60=High)	35.432	35.926	35.482	35.026	34.816	34.637	35.354	34.693	34.923	34.469	34.064	33.838	33.508	34.352

* Target sample for first follow-up, classes of 1976-1988 (combined).
**Mean years from base-year to follow-up.

Table 2.2
Current Characteristics Measured in Follow-Up by Sex and Endpoint of BY-FU Interval

(Entries are Proportions of the Sample)

	Males						Females						Total
	Obtained Sample						Obtained Sample						
	FU1	FU2	FU3	FU4	FU5	Total	FU1	FU2	FU3	FU4	FU5	Total	
Modal Age:	19-20	21-22	23-24	25-26	27-28		19-20	21-22	23-24	25-26	27-28		
Class years included:	76-88	76-86	76-84	76-82	76-80	76-88	76-88	76-86	76-84	76-82	76-80	76-88	76-88
Interval length (years)	1.478	3.471	5.466	7.457	9.438	4.404	1.478	3.470	5.464	7.459	9.441	4.387	4.395
Number of cases (Wtd.)	8,077	6,523	5,124	3,762	2,539	26026	9,732	7,787	6,045	4,471	3,008	31043	57,069
Education													
Student status:													
Full-time	.527	.400	.184	.101	.056	.320	.529	.371	.125	.061	.041	.296	.307
Part-time	.074	.087	.116	.100	.100	.092	.083	.082	.106	.102	.095	.091	.091
Highest degree earned (1=Bachelor's or higher)	.036	.049	.270	.345	.374	.153	.017	.051	.257	.296	.311	.136	.144
Employment													
Employment status:													
Full-time civilian	.336	.460	.653	.762	.826	.539	.302	.447	.622	.661	.648	.486	.510
Full-time military	.056	.065	.054	.046	.039	.055	.008	.008	.009	.006	.006	.008	.029
Part-time job	.259	.202	.126	.079	.052	.172	.310	.249	.145	.111	.113	.215	.195
Full-time homemaker	.004	.003	.003	.002	.002	.003	.037	.057	.089	.108	.128	.071	.040
Not employed & not student	.044	.049	.057	.046	.041	.048	.048	.055	.056	.055	.057	.053	.051
Mean Weeks Unemployed Last Calendar year	4.858	3.635	3.633	2.830	2.064	3.744	5.580	3.960	3.535	2.785	2.272	4.052	3.912
Mean Gross Work Earnings last Calendar year (000's)	4.459	7.828	11.903	16.884	20.609	10.034	3.126	5.481	8.665	11.545	13.325	6.840	8.296
Mean Status Ranking for Current or most recent Job (1=laborer, 14=PhD)	4.405	5.467	7.191	8.133	8.744	5.922	4.135	4.962	6.613	7.418	7.824	5.368	5.621
Current Living Arrangements													
Married	.041	.138	.270	.414	.524	.211	.099	.238	.392	.520	.596	.300	.260
Partner of opposite sex	.026	.054	.067	.075	.072	.053	.050	.074	.086	.083	.078	.070	.062
Parents	.526	.385	.308	.196	.132	.362	.496	.345	.256	.161	.106	.326	.342
Dormitory	.214	.101	.025	.010	.001	.098	.221	.096	.014	.003	.003	.097	.097
Alone	.028	.058	.105	.122	.135	.075	.019	.044	.079	.089	.096	.054	.064
All other arrangments	.164	.264	.225	.183	.136	.201	.115	.203	.174	.144	.121	.153	.175
Parenthood													
Single parent	.018	.028	.038	.042	.051	.031	.033	.055	.070	.079	.088	.058	.046
Married parent	.015	.059	.127	.218	.318	.107	.029	.103	.189	.287	.382	.150	.130
Self/Spouse pregnant	.012	.024	.042	.052	.066	.037	.030	.043	.054	.076	.070	.053	.045
Engagement status	.063	.083	.086	.068	.046	.072	.107	.115	.089	.067	.044	.093	.083

Table 2.3
Bivariate Frequency Distributions Relating Student Status with Employment Status (FU1 - FU5)

Employment Status:

Males

Student Status:		F/T Civilian	F/T Military	P/T Civilian	F/T Homemaker	Not a Student & Unemployed	Other	Total	
F/Time	FU1	4.8	0.9	19.9	0.2	0.0	26.8	52.7	
	FU2	4.7	0.4	15.3	0.1	0.0	19.4	40.0	
	FU3	3.0	0.3	7.2	0.1	0.0	7.8	18.4	
	FU4	2.2	0.3	4.1	0.0	0.0	3.5	10.1	
	FU5	1.5	0.2	2.4	0.0	0.0	1.6	5.6	
P/Time	FU1	3.3	0.6	2.4	0.0	0.0	1.0	7.4	
	FU2	5.0	0.8	1.9	0.0	0.0	1.0	8.7	
	FU3	8.1	0.6	1.8	0.1	0.0	1.0	11.6	
	FU4	7.5	0.6	1.1	0.0	0.0	0.7	10.0	
	FU5	8.1	0.6	0.9	0.0	0.0	0.4	10.0	
Not	FU1	25.5	4.1	3.5	0.2	4.3	2.2	39.8	
	FU2	36.4	5.3	2.9	0.1	4.9	1.7	51.4	
	FU3	54.2	4.5	3.6	0.2	5.7	2.0	70.0	
	FU4	66.4	3.7	2.6	0.2	4.6	2.5	79.9	
	FU5	73.0	3.1	2.0	0.2	4.1	2.1	84.4	
Total	FU1	33.6	5.6	25.9	0.4	4.3	30.1	100.0	N=8077
	FU2	46.0	6.5	20.2	0.3	4.9	22.1	100.0	N=6523
	FU3	65.3	5.4	12.6	0.3	5.7	10.8	100.0	N=5124
	FU4	76.2	4.5	7.9	0.2	4.6	6.6	100.0	N=3762
	FU5	82.6	3.9	5.2	0.2	4.1	4.1	100.0	N=2539

Females

Student Status:		F/T Civilian	F/T Military	P/T Civilian	F/T Homemaker	Not a Student & Unemployed	Other	Total	
F/Time	FU1	3.9	0.1	22.3	0.8	0.0	25.8	52.9	
	FU2	4.0	0.0	17.4	0.4	0.0	15.4	37.1	
	FU3	2.1	0.1	5.4	0.3	0.0	4.7	12.5	
	FU4	1.4	0.0	2.1	0.3	0.0	2.3	6.0	
	FU5	0.8	0.0	1.5	0.3	0.0	1.5	4.1	
P/Time	FU1	3.7	0.1	2.7	0.2	0.0	1.5	8.3	
	FU2	5.0	0.2	1.6	0.3	0.0	1.1	8.2	
	FU3	7.6	0.2	1.7	0.3	0.0	0.8	10.6	
	FU4	7.6	0.2	0.9	0.4	0.0	1.1	10.2	
	FU5	7.1	0.2	1.0	0.6	0.0	0.6	9.5	
Not	FU1	22.6	0.6	6.1	2.6	4.8	2.2	38.9	
	FU2	35.7	0.6	5.9	5.0	5.5	2.0	54.6	
	FU3	52.6	0.6	7.4	8.2	5.6	2.4	76.9	
	FU4	57.1	0.4	8.0	10.1	5.5	2.6	83.8	
	FU5	56.9	0.3	8.8	11.9	5.7	2.8	86.3	
Total	FU1	30.2	0.8	31.0	3.7	4.8	29.5	100.0	N=9732
	FU2	44.7	0.8	24.9	5.7	5.5	18.5	100.0	N=7787
	FU3	62.2	0.8	14.5	8.9	5.6	8.0	100.0	N=6045
	FU4	66.1	0.6	11.1	10.8	5.5	6.0	100.0	N=4471
	FU5	64.8	0.6	11.3	12.8	5.7	4.9	100.0	N=3008

Table 2.4
Bivariate Frequency Distributions Relating Student Status with Living Arrangements (FU1 - FU5)

Living Arrangements:

Males

Student Status:		Married	Partner	Parents	Dorm	Alone	Other	Total	
F/Time	FU1	0.5	0.9	22.0	21.0	0.7	7.6	52.7	
	FU2	1.3	1.5	11.0	9.7	1.6	14.9	40.0	
	FU3	2.3	1.0	4.6	2.3	1.5	6.7	18.4	
	FU4	2.4	0.6	2.0	0.9	1.1	3.1	10.1	
	FU5	2.0	0.4	0.7	0.1	0.8	1.5	5.6	
P/Time	FU1	0.3	0.3	5.2	0.2	0.3	1.2	7.4	
	FU2	1.0	0.5	4.6	0.1	0.5	1.9	8.7	
	FU3	2.6	0.8	4.2	0.1	1.3	2.6	11.6	
	FU4	3.5	0.7	1.9	0.1	1.1	2.7	10.1	
	FU5	4.8	0.8	1.2	0.0	1.5	1.7	10.0	
Not	FU1	3.3	1.4	25.5	0.3	1.8	7.6	39.8	
	FU2	11.5	3.4	22.9	0.2	3.7	9.6	51.4	
	FU3	22.0	4.9	22.1	0.1	7.7	13.2	70.0	
	FU4	35.5	6.2	15.6	0.0	10.0	12.5	79.9	
	FU5	45.5	5.9	11.3	0.0	11.1	10.4	84.4	
Total	FU1	4.1	2.6	52.6	21.4	2.8	16.4	100.0	N=8077
	FU2	13.8	5.4	38.5	10.1	5.8	26.4	100.0	N=6523
	FU3	26.9	6.7	30.8	2.5	10.5	22.5	100.0	N=5124
	FU4	41.4	7.5	19.6	1.0	12.2	18.3	100.0	N=3762
	FU5	52.4	7.2	13.2	0.1	13.5	13.6	100.0	N=2539

Females

Student Status:		Married	Partner	Parents	Dorm	Alone	Other	Total	
F/Time	FU1	1.1	1.4	22.2	21.7	0.6	5.9	52.9	
	FU2	1.8	1.7	10.8	9.4	1.4	12.1	37.1	
	FU3	1.7	1.0	3.3	1.2	1.1	4.2	12.5	
	FU4	1.9	0.5	1.2	0.3	0.6	1.5	6.0	
	FU5	1.7	0.5	0.3	0.2	0.4	1.0	4.1	
P/Time	FU1	0.6	0.5	5.7	0.2	0.3	0.9	8.3	
	FU2	1.5	0.6	4.4	0.1	0.5	1.2	8.2	
	FU3	3.0	0.8	3.9	0.1	0.9	1.8	10.6	
	FU4	4.1	1.0	1.8	0.0	1.5	1.8	10.2	
	FU5	4.8	0.7	1.1	0.0	1.3	1.7	9.5	
Not	FU1	8.1	3.1	21.8	0.2	1.0	4.7	38.9	
	FU2	20.5	5.1	19.3	0.1	2.5	7.1	54.6	
	FU3	34.5	6.7	18.4	0.0	5.8	11.3	76.9	
	FU4	46.1	6.8	13.1	0.0	6.9	11.0	83.8	
	FU5	53.1	6.6	9.2	0.1	7.9	9.4	86.3	
Total	FU1	9.9	5.0	49.6	22.1	1.9	11.5	100.0	N=9732
	FU2	23.8	7.4	34.5	9.6	4.3	20.3	100.0	N=7787
	FU3	39.2	8.6	25.6	1.4	7.9	17.4	100.0	N=6045
	FU4	52.0	8.2	16.1	0.3	8.9	14.4	100.0	N=4471
	FU5	59.6	7.8	10.6	0.3	9.6	12.1	100.0	N=3008

Table 2.5
Bivariate Frequency Distributions Relating Living Arrangements with Employment Status (FU1 - FU5)

Employment Status:

Males

Living Arrangements:		F/T Civilian	F/T Military	P/T Job	F/T Homemaker	Not a Student & Unemployed	Other	Total	
	FU1	2.6	0.5	0.4	0.0	0.2	0.3	4.1	
	FU2	9.7	1.6	0.8	0.0	0.7	0.9	13.8	
Married	FU3	20.6	2.1	1.6	0.1	1.2	1.4	26.9	
	FU4	33.4	2.8	1.8	0.2	1.5	1.8	41.4	
	FU5	45.0	2.7	1.8	0.2	1.2	1.6	52.4	
	FU1	1.3	0.1	0.4	0.0	0.1	0.6	2.6	
	FU2	3.2	0.3	0.8	0.0	0.3	0.8	5.4	
Partner	FU3	4.7	0.1	0.9	0.0	0.5	0.5	6.7	
	FU4	5.9	0.1	0.6	0.0	0.4	0.4	7.5	
	FU5	5.7	0.3	0.6	0.0	0.4	0.2	7.2	
	FU1	23.9	0.2	16.1	0.2	3.2	9.0	52.6	
	FU2	22.0	0.1	8.5	0.1	2.9	4.8	38.5	
Parents	FU3	20.6	0.2	4.9	0.0	2.6	2.5	30.8	
	FU4	14.5	0.1	2.1	0.0	1.5	1.3	19.6	
	FU5	9.9	0.1	1.1	0.0	1.3	0.8	13.2	
	FU1	0.7	0.1	5.4	0.1	0.1	15.0	21.4	
	FU2	0.8	0.1	3.1	0.0	0.1	6.0	10.1	
Dorm	FU3	0.3	0.1	0.7	0.0	0.0	1.4	2.5	
	FU4	0.2	0.0	0.4	0.0	0.0	0.4	1.0	
	FU5	0.0	0.0	0.1	0.0	0.0	0.0	0.1	
	FU1	1.4	0.5	0.4	0.0	0.1	0.4	2.8	
	FU2	3.2	0.7	0.7	0.0	0.2	0.9	5.8	
Alone	FU3	7.5	0.7	1.1	0.0	0.3	0.9	10.5	
	FU4	9.4	0.5	0.9	0.0	0.5	0.8	12.2	
	FU5	10.3	0.5	0.9	0.0	0.8	1.1	13.6	
	FU1	3.7	4.2	3.1	0.1	0.6	4.7	16.4	
	FU2	7.1	3.7	6.1	0.0	0.8	8.8	26.4	
Other	FU3	11.6	2.2	3.4	0.1	1.1	4.2	22.5	
	FU4	12.7	1.0	2.1	0.0	0.7	1.9	18.3	
	FU5	11.7	0.3	0.7	0.0	0.4	0.5	13.5	
	FU1	33.6	5.6	25.9	0.4	4.3	30.0	100.0	N=8077
	FU2	46.0	6.5	20.2	0.3	4.9	22.1	100.0	N=6523
Total	FU3	65.3	5.4	12.6	0.3	5.7	10.8	100.0	N=5124
	FU4	76.2	4.5	7.9	0.2	4.6	6.6	100.0	N=3762
	FU5	82.6	3.9	5.2	0.2	4.1	4.1	100.0	N=8077

Table 2.5
Bivariate Frequency Distributions Relating Living Arrangements with Employment Status (FU1 - FU5)

Employment Status:
Females

Living Arrangements:		F/T Civilian	F/T Military	P/T Job	F/T Homemaker	Not a Student & Unemployed	Other	Total	
	FU1	4.4	0.2	1.6	1.8	1.0	0.9	9.9	
	FU2	11.6	0.3	3.7	4.5	2.2	1.6	23.8	
Married	FU3	22.2	0.4	5.0	7.6	2.4	1.6	39.2	
	FU4	30.1	0.3	6.5	9.6	3.0	2.5	52.0	
	FU5	33.6	0.3	8.3	11.6	3.3	2.4	59.6	
	FU1	2.3	0.0	1.2	0.3	0.4	0.8	5.0	
	FU2	4.2	0.1	1.5	0.3	0.6	0.8	7.4	
Partner	FU3	5.7	0.0	1.2	0.4	0.6	0.6	8.6	
	FU4	6.4	0.0	0.6	0.4	0.5	0.4	8.2	
	FU5	5.6	0.0	0.6	0.3	0.6	0.6	7.8	
	FU1	18.2	0.0	17.6	1.1	2.8	9.9	49.6	
	FU2	18.6	0.0	9.1	0.5	2.0	4.3	34.5	
Parents	FU3	17.4	0.0	4.0	0.4	1.7	2.0	25.6	
	FU4	11.9	0.0	1.8	0.3	1.0	1.1	16.1	
	FU5	8.1	0.0	0.7	0.3	1.0	0.5	10.6	
	FU1	0.8	0.0	7.0	0.2	0.1	14.1	22.1	
	FU2	0.8	0.0	4.2	0.0	0.0	4.6	9.6	
Dorm	FU3	0.2	0.0	0.6	0.0	0.0	0.6	1.4	
	FU4	0.0	0.0	0.1	0.0	0.0	0.2	0.3	
	FU5	0.1	0.0	0.1	0.0	0.0	0.1	0.3	
	FU1	1.1	0.0	0.4	0.0	0.1	0.3	1.9	
	FU2	2.7	0.1	0.7	0.0	0.1	0.7	4.3	
Alone	FU3	6.1	0.1	0.7	0.0	0.2	0.8	7.9	
	FU4	7.4	0.1	0.6	0.0	0.3	0.5	8.9	
	FU5	8.4	0.1	0.4	0.0	0.2	0.5	9.6	
	FU1	3.4	0.5	3.2	0.3	0.6	3.5	11.5	
	FU2	6.8	0.3	5.7	0.4	0.6	6.5	20.3	
Other	FU3	10.6	0.3	3.0	0.5	0.7	2.3	17.4	
	FU4	10.2	0.2	1.4	0.5	0.6	1.3	14.4	
	FU5	8.9	0.2	1.2	0.5	0.5	0.8	12.1	
	FU1	30.2	0.8	31.0	3.7	4.8	29.5	100.0	N=9732
	FU2	44.7	0.8	24.9	5.7	5.5	18.5	100.0	N=7787
Total	FU3	62.2	0.8	14.5	8.9	5.6	8.0	100.0	N=6045
	FU4	66.1	0.6	11.1	10.8	5.5	6.0	100.0	N=4471
	FU5	64.8	0.6	11.3	12.8	5.7	4.9	100.0	N=3008

Table 3.1
Changes in Cigarette Use Over Each BY-FU Interval by Sex and Endpoint of Interval

	Males						Females						Total
	FU1	FU2	FU3	FU4	FU5	Total	FU1	FU2	FU3	FU4	FU5	Total	
Modal Age:	19-20	21-22	23-24	25-26	27-28		19-20	21-22	23-24	25-26	27-28		
Class years included:	76-88	76-86	76-84	76-82	76-80	76-88	76-88	76-86	76-84	76-82	76-80	76-88	76-88
Interval length (years)	1.478	3.471	5.466	7.457	9.438	4.404	1.478	3.470	5.464	7.459	9.441	4.387	4.395
Number of cases (Wtd.)	8,077	6,523	5,124	3,762	2,539	26026	9,732	7,787	6,045	4,471	3,008	31043	57069
Part A													
Mean change 30-day (-6 to +6)	.158	.251	.283	.251	.222	.226	.116	.168	.160	.126	.052	.133	.175
Base year mean (1-7)	1.640	1.680	1.710	1.748	1.778	1.693	1.756	1.779	1.798	1.816	1.865	1.789	1.746
Follow-up mean (1-7)	1.798	1.931	1.993	1.999	2.000	1.919	1.872	1.947	1.958	1.941	1.917	1.922	1.921
Part B													
Change patterns in use dichotomies													
1 or more per day													
BY=Yes, FU=No (%)	3.3	3.8	4.4	5.4	6.2	4.2	4.2	5.5	6.4	7.4	9.5	5.6	5.2
Base Year mean	3.753	3.875	3.891	3.998	3.947	3.882	3.526	3.650	3.710	3.675	3.731	3.652	3.738
Follow-up mean	1.333	1.262	1.214	1.136	1.129	1.227	1.367	1.278	1.203	1.196	1.170	1.250	1.242
BY=No, FU=Yes (%)	7.1	9.5	10.1	10.2	9.9	9.0	7.0	8.6	8.9	8.7	7.8	8.1	8.5
Base Year mean	1.357	1.299	1.269	1.276	1.286	1.301	1.426	1.341	1.294	1.281	1.292	1.340	1.321
Follow-up mean	3.947	4.254	4.442	4.478	4.603	4.295	3.677	4.034	4.174	4.338	4.327	4.043	4.164
BY=Yes,FU=Yes (%)	14.0	14.5	14.9	14.9	14.9	14.5	17.6	17.1	16.8	16.6	16.1	17.0	15.9
Base Year mean	4.242	4.283	4.292	4.300	4.370	4.284	4.095	4.113	4.127	4.115	4.145	4.113	4.184
Follow-up mean	4.650	4.806	4.920	5.021	5.052	4.839	4.396	4.578	4.664	4.663	4.778	4.566	4.680
BY=No, FU=No (%)	75.6	72.3	70.6	69.5	69.0	72.2	71.2	68.8	67.9	67.3	66.6	68.9	70.4
Base Year mean	1.091	1.093	1.092	1.097	1.095	1.093	1.106	1.104	1.109	1.113	1.114	1.108	1.101
Follow-up mean	1.087	1.086	1.073	1.057	1.045	1.076	1.102	1.084	1.068	1.044	1.045	1.078	1.077
Part C													
Change patterns in use dichotomies													
1 /2 pack or more per day													
BY=Yes FU=No (%)	2.3	2.7	3.2	3.8	4.2	3.0	2.8	3.4	4.1	4.6	5.7	3.7	3.4
Base Year mean	4.526	4.600	4.563	4.690	4.626	4.595	4.372	4.425	4.446	4.453	4.466	4.429	4.495
Follow-up mean	1.808	1.687	1.576	1.469	1.448	1.618	2.007	1.773	1.640	1.647	1.476	1.731	1.686
BY=No, FU=Yes (%)	6.5	9.1	10.3	10.1	10.1	8.8	6.3	9.0	9.6	10.1	9.4	8.5	8.6
Base Year mean	1.950	1.769	1.689	1.688	1.629	1.762	2.223	2.013	1.935	1.923	1.924	2.020	1.901
Follow-up mean	4.587	4.767	4.842	4.955	4.983	4.799	4.458	4.641	4.722	4.823	4.829	4.668	4.729
BY=Yes,FU=Yes (%)	9.7	10.3	10.6	10.8	11.3	10.4	10.6	10.8	10.6	10.1	10.1	10.5	10.4
Base Year mean	4.697	4.702	4.711	4.707	4.716	4.705	4.664	4.651	4.660	4.666	4.675	4.661	4.681
Follow-up mean	5.012	5.131	5.275	5.351	5.335	5.181	4.885	4.971	5.069	5.069	5.160	4.994	5.078
BY=No, FU=No (%)	81.5	77.9	75.9	75.3	74.3	77.9	80.3	76.9	75.8	75.2	74.8	77.3	77.6
Base Year mean	1.172	1.168	1.173	1.187	1.189	1.175	1.245	1.233	1.239	1.257	1.277	1.245	1.213
Follow-up mean	1.192	1.185	1.164	1.150	1.117	1.172	1.265	1.217	1.190	1.155	1.148	1.212	1.194

Table 3.2
Follow-up Smoking Behaviors of Those Who Smoked 1/2 Pack per Day or More During Senior Year of High School

	Males					Females				
Follow-Up Smoking during Past 30 Days:	FU1	FU2	FU3	FU4	FU5	FU1	FU2	FU3	FU4	FU5
1/2 pack or more daily	9.7	10.3	10.6	10.8	11.3	10.6	10.8	10.6	10.1	10.1
	81.2	*79.1*	*76.9*	*74.0*	*72.6*	*79.4*	*75.9*	*72.1*	*68.5*	*63.9*
Some, but less than 1/2 pack	1.1	1.1	1.1	1.1	1.1	1.6	1.6	1.6	1.8	1.7
	9.2	*8.6*	*8.1*	*7.5*	*7.4*	*12.0*	*11.4*	*10.9*	*12.4*	*10.7*
None	1.1	1.6	2.1	2.7	3.1	1.1	1.8	2.5	2.8	4.0
	9.6	*12.3*	*15.0*	*18.4*	*19.9*	*8.6*	*12.7*	*17.0*	*19.2*	*25.4*
Total	11.9	13.0	13.8	14.6	15.5	13.3	14.2	14.7	14.7	15.8
	100.0	*100.0*	*100.0*	*99.9*	*99.9*	*100.0*	*100.0*	*100.0*	*100.1*	*100.0*
N(wtd)	7631	6171	4878	3599	2437	9294	7469	5822	4307	2917
	913	*804*	*674*	*523*	*379*	*1242*	*1058*	*853*	*633*	*463*

NOTE: Upper entries are percentages of the total samples; lower entries in italics are percentages of those who smoked a half-pack a day or more as high school seniors.

TABLE 3.3
REGRESSION ANALYSES LINKNG POST HIGH SCHOOL EXPERIENCES TO CHANGES IN 30-DAY CIGARETTE USE--BY TO FU

	CHANGE SCORES					DAILY			
VARIABLE	BIV. COEFF.	BKGD.	BKGD+ STUD/WORK	BKGD+ LIV.ARR.	ALL SETS	STOP ALL SETS	START ALL SETS	BOTH ALL SETS	NEITHER ALL SETS
CONSTANT	0.176	0.176	0.176	0.176	0.176	0.051	0.085	0.157	0.707 #
BASE YEAR (76-88)	-0.006	-0.007	-0.007	-0.008 #	-0.008 #	-0.002 #	-0.001	-0.009 #	0.012 #
SET#1 GENDER									
FEMALE	-0.043	-0.043 #	-0.032 #	-0.017	-0.011	0.007 #	0.002	0.021 #	-0.030 #
MALE	0.051	0.051 #	0.038 #	0.020	0.013	-0.008 #	-0.003	-0.025 #	0.036 #
SET#2 RACE									
WHITE	-0.008	-0.011 #	-0.010	-0.009	-0.009	0.004 #	-0.001	0.009 #	-0.012 #
BLACK	0.095	0.103 #	0.096 #	0.086 #	0.078 #	-0.034 #	0.009	-0.072 #	0.097 #
OTHER	-0.036	-0.015	-0.013	-0.011	-0.009	0.004	-0.005	0.001	-0.000
SET#3 REGION									
SOUTH	0.022	0.000	-0.002	0.005	0.004	-0.002	-0.004	0.007	-0.001
NORTH EAST	-0.048	-0.033	-0.033	-0.036	-0.038	0.013 #	-0.000	0.022 #	-0.035 #
NORTH CENTRAL	0.035	0.038 #	0.039 #	0.037 #	0.038 #	-0.002	0.007	0.008	-0.012 #
WEST	-0.037	-0.023	-0.023	-0.027	-0.024	-0.012 #	-0.006	-0.062 #	0.080 #
HS GRADE/D=1	-0.004	-0.003	0.000	-0.003	0.001	-0.009 #	-0.005 #	-0.029 #	0.043 #
R WL DO 4YR CLG	0.009	0.019	0.034 #	0.011	0.027 #	-0.005 #	0.004	-0.023 #	0.023 #
URBANICITY	-0.035	-0.035 #	-0.033 #	-0.037 #	-0.035 #	0.005 #	-0.006 #	0.011 #	-0.010 #
SET#4 FOLLOW UP #									
FU #1	-0.034	-0.026	-0.007	-0.035	-0.023	-0.002	-0.005	0.039 #	-0.032 #
FU #2	0.040	0.041 #	0.046 #	0.027	0.032	-0.002	0.004	0.005	-0.008
FU #3	0.039	0.034	0.019	0.028	0.016	0.000	0.005	-0.025 #	0.020 #
FU #4	-0.004	-0.013	-0.035	0.007	-0.010	0.003	-0.002	-0.040 #	0.038 #
FU #5	-0.077	-0.089 #	-0.113 #	-0.021	-0.032	0.008	-0.001	-0.063 #	0.056 #
SET#5 YEARS, BY TO FU#1									
ONE YEAR	-0.006	-0.005	-0.003	-0.006	-0.004	-0.000	-0.003	0.005	-0.001
TWO YEARS	0.007	0.006	0.003	0.006	0.005	0.001	0.004	-0.006	0.002
SET#6 FU STUDENT STATUS									
FULL-TIME STUDENT	-0.052		-0.041		-0.072 #	-0.001	-0.014 #	-0.034 #	0.049 #
PART-TIME STUDENT	-0.043		-0.049		-0.052	0.008	-0.004	-0.011	0.008
NOT A STUDENT	0.034		0.029 #		0.045 #	-0.000	0.008 #	0.019 #	-0.027 #
SET#7 FU WORK STATUS									
FULL-TIME CIVILIAN JOB	0.025		0.017		0.006	0.000	0.002	-0.001	-0.001
MILITARY SERVICE	0.323		0.279 #		0.255 #	-0.008	0.041 #	0.025	-0.057 #
PART-TIME CIVILIAN JOB	-0.053		-0.034		-0.024	-0.000	-0.003	-0.006	0.009
HOMEMAKER	-0.166		-0.146 #		-0.036	-0.004	-0.007	-0.006	0.018
NONSTUDENT, NOT EMPLOYED	0.067		0.041		0.050	-0.001	0.005	0.037 #	-0.041 #
OTHER	-0.060		-0.045		-0.048	0.002	-0.011	-0.004	0.013
SET#8 FU LIVING ARRANGEMENTS									
MARRIED	-0.087			-0.084 #	-0.110 #	0.012 #	-0.016 #	-0.002	0.006
PARTNER	0.148			0.137 #	0.126 #	0.011	0.034 #	0.079 #	-0.125 #
PARENT(S)	-0.011			-0.002	0.005	-0.008 #	-0.005	-0.010	0.023 #
DORMITORY	-0.036			-0.018	0.058	-0.010	0.003	-0.024 #	0.031 #
LIVE ALONE	0.130			0.094 #	0.071	-0.005	0.016	0.006	-0.017
OTHER	0.100			0.085 #	0.079 #	-0.002	0.019 #	0.010	-0.027 #
SET#9 FU PREGNANCY STATUS									
SPOUSE	0.075			0.052	0.046	0.012	0.016	0.011	-0.038
SELF	-0.407			-0.324 #	-0.334 #	0.049 #	-0.035 #	-0.053 #	0.037
NOT PREGNANT	0.011			0.009 #	0.009 #	-0.002 #	0.001	0.001	-0.000
SET#10 FU PARENTHOOD STATUS									
MARRIED FATHER	0.079			0.087	0.079	0.004	0.019	0.041 #	-0.064 #
MARRIED MOTHER	-0.180			-0.086 #	-0.078	0.011	-0.015	0.008	-0.004
SINGLE FATHER	0.361			0.263 #	0.252 #	0.011	0.073 #	0.072 #	-0.156 #
SINGLE MOTHER	0.053			0.007	-0.005	0.022	-0.007	0.077 #	-0.093 #
NOT A PARENT	0.007			-0.000	-0.000	-0.002	-0.000	-0.007 #	0.009 #

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	CHANGE SCORES					DAILY			
						STOP	START	BOTH	NEITHER
VARIABLE	ETA	BETA	BETA	BETA	BETA	BETA	BETA	BETA	BETA
BASE YEAR (76-88)	-0.0157	-0.0171	-0.0173	-0.0216 #	-0.0217 #	-0.0232 #	-0.0163	-0.0767 #	0.0826 #
SET#1 GENDER	0.0390	0.0389 #	0.0291 #	0.0151	0.0097	0.0338 #	0.0096	0.0629 #	0.0723 #
SET#2 RACE	0.0270	0.0283 #	0.0264 #	0.0237 #	0.0214	0.0510 #	0.0115	0.0659 #	0.0709 #
SET#3 REGION	0.0298	0.0231	0.0236	0.0241	0.0248 #	0.0365 #	0.0181	0.0749 #	0.0803 #
HS GRADE/D-1	-0.0070	-0.0046	0.0005	-0.0045	0.0014	-0.0765 #	-0.0363 #	-0.1512 #	0.1795 #
R WL DO 4YR CLG	0.0092	0.0183	0.0330 #	0.0105	0.0266 #	-0.0244 #	0.0162	-0.0738 #	0.0601 #
URBANICITY	-0.0317	-0.0314 #	-0.0300 #	-0.0330 #	-0.0312 #	0.0263 #	-0.0245 #	0.0318 #	-0.0230 #
SET#4 FOLLOW UP #	0.0325	0.0323 #	0.0343 #	0.0233	0.0201	0.0131	0.0153	0.0927 #	0.0648 #
SET#5 YEARS, BY TO FU#1	0.0053	0.0049	0.0026	0.0050	0.0039	0.0024	0.0124	0.0148	0.0031
SET#6 FU STUDENT STATUS	0.0339		0.0290		0.0460 #	0.0111	0.0349	0.0665 #	0.0753 #
SET#7 FU WORK STATUS	0.0640		0.0524 #		0.0424 #	0.0082	0.0310	0.0275	0.0343 #
SET#8 FU LIVING ARRANGEMENTS	0.0650			0.0575 #	0.0645 #	0.0411 #	0.0537 #	0.0594 #	0.0792 #
SET#9 FU PREGNANCY STATUS	0.0580			0.0461 #	0.0475 #	0.0393 #	0.0224 #	0.0249 #	0.0174
SET#10 FU PARENTHOOD STATUS	0.0569			0.0353 #	0.0329 #	0.0246	0.0360 #	0.0507 #	0.0616 #
R sqr.		0.0054 #	0.0092 #	0.0124 #	0.0162 #	0.0210 #	0.0114 #	0.0792 #	0.0972 #
R sqr., adjusted		0.0047	0.0082	0.0111	0.0145	0.0194	0.0098	0.0777	0.0957
R sqr., reg 2/3 - reg 1			0.0038 #	0.0070 #					
R sqr., reg 2/3 - reg 1, adjusted				0.0035	0.0065				
R sqr., reg 4 - reg 3/2			0.0037 #	0.0069 #					
R sqr., reg 4 - reg 3/2, adjusted				0.0034	0.0064				

NOTE: # indicates probability < .01

The following definitions and guidelines may help the reader in interpreting this and subsequent tables of regression findings:
The "CONSTANT" shown at the top to columns 1-5 is simply the average change score on the dependent variable, "30-day cigarette use," between the base year and the follow-up data collections. As described in the text, "30-day cigarette use" is measured by a question asked about number of cigarettes smoked in the last 30 days, with seven answer categories ranging from 1 ("Not at all") to 7 ("Two or more packs a day"). The value of .176 indicates that, on the average, cigarette use increased by about 1/6th of the interval between pairs of categories on this 7-point scale.

The coefficients for intervally-scaled predictor variables are conventional unstandardized bivariate (column1) and multiple (columns 2-5) regression coefficients. As such, they indicate the deviation from the average change on the dependent variable associated with a unit change on the predictor variable. For example, the coefficient in the first column for the predictor variable "Base Year" is -.006; this indicates that the average reported change in 30-day cigarette use changed by .006 units less for respondents who were seniors in year t+1 (say, 1981) than for those who were seniors in year t (1980, for this example). To obtain the predicted change for those who were seniors in any particular year, it is necessary to convert the base year to a deviation score, multiply that deviation score by the coefficient (-.006) and add that to the overall average change (.176). For example, the average value on the variable "Base Year" is 1980.5, so the predicted change score for those who were seniors in 1980 is:

$$.176 + (1980 - 1980.5) * (-.006) = .179$$

That is the predicted change based on the simple bivariate association between change in 30-day cigarette use and base year. The subsequent columns provide the multiple regression coefficients for the predictor, taking into account the other variables for which coefficients are shown in that particular column. For example, if background characteristics of the respondents are taken into account, the multiple regression coefficient for Base Year is .007: the change in 30-day cigarette scores declines .007 units for every successive year. The statistical significance of these multiple regression coefficients are assessed by the t-ratio (not shown), and if the null hypothesis of no relationship can be rejected at the .01 level, the coefficient is marked with a pound (#) sign. In this example, the multiple regression coefficient for base year is not significant at the .01 level when background variables are taken into account, nor when background variables and changes in work and student status are taken into account, but is significant when changes in living arrangements are taken into account.

The entries given for categorical variables are less conventional, but nevertheless, even more readily interpretable than those for intervally-scaled predictor variables. The coefficient given for each value of a categorical variable is simply the predicted deviation from the overall average for respondents in that category. For example, the first set in this table is for gender, and consists of the two categories "Female" and "Male." The coefficient for females in the first column is -.043, indicating that the average change for women was -.043 units below the average: .176 - .043 =.133. The coefficient in the second column is also -.043, indicating that the predicted change for women is .133 even after taking into account other background variables. The "#" next to this coefficient indicates that the change for women was significantly less than average.

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In the case of intervally-scaled predictor variables, the eta and beta coefficients printed on the scond part of this table are the standardized regression coefficients. The eta coefficient for the variable "Base Year" is -.0157, indicating that the average change on the measure of 30-day cigarette use increases by .0157 standard deviation units less than average for every standard deviation increase on the predictor variable. (It may help the reader to recall that the standardized bivariate regression coefficient is simply the correlation between the predictor and the dependent variable.) The beta coefficient in the second column is -.071, indicating that when other background variables are taken into account, the predicted change increases by .0171 standard deviations less than average for every standard deviation increase on the predictor variable.

For categorical variables, the eta coefficient is the correlation ratio (Hays, 1973, p.683), which is defined as the ratio of the sum of squares between groups to the total sum of squares. The beta coefficient is defined analogously, but after scores have been adjusted to equate the groups on the other variables included in the multiple regression analysis. (It may help the reader to note that the eta and beta coefficients for gender, with just two categories, are identical to the standardized bivariate and multiple regression coefficients for gender if it is treated as an intervally-scaled variable.)

The R squared values in the final rows of the table indicate the total and marginal predictive power of the various sets of predictor variables. These are printed both unadjusted and adjusted for degrees of freedom. For example, the entry of .0054 in the second column indicates that the background variables explain about one-half percent of the variance in the change in scores on the 30-day cigarette use measure; adjusting for degrees of freedom reduces this value to .0047, which is an unbiased measure of the population value. The "#" next to the .0054 value indicates that the null hypothesis (background variables have no effect on change in cigarette use) can be rejected at the .01 level. (Significance is indicated for the unadjusted values, but apply equally to the adjusted values.)

The unadjusted R squared value of .0092 in the third column indicates that background, work, and student status variables together explain somewhat less than 1 percent of the variance; the increase in explanatory power over the background variables alone is .0038 - - the marginal predictive power of the student and work status variables. Similarly, the background and living arrangement variables together explain 1.24 percent of the variance, and the marginal predictive power of the living arrangement variables is 0.70 percent. All three sets of variables together explain 1.62 percent of the variance. Working backwards from that value, the other entries indicate that the marginal predictive power of the student and work status variables, beyond what can be explained by the background and living arrangement variables, is 0.37 percent, while the marginal predictive power of the living arrangement variables, beyond what can be explained by the background and student and work status variables, is 0.69 percent.

The entries in the remaining columns (6 to 9 and 10 to 13) are comparable to those in column 5, except that each refers to a different dependent variable. In column 6, for example, the dependent variable is dichotomous: scores of 1 are given to those who said that they smoked at least one cigarette per day in the base year, but did not do so at the time of the follow-up data collection, and scores of 0 are given to everyone else. In this case, the "Constant," .051, is simply the proportion of respondents who stopped daily smoking -- about 5.1 percent, overall. The coefficient in this column for the intervally-scaled variable, "Base year," indicates that the proportion stopping declined by 0.2 percent for each successive cohort of high school seniors (adjusting for all other variables shown in this table), and the "#" sign indicates that this is a statistically significant decline. Women were 0.7 percent more likely than average to have stopped, and men were 0.8 percent less likely than average to have stopped, and men were 0.8 percent less likely than average to have stopped (that is, women were 1.5 percent more likely than men to have stopped).

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Table 3.4
Actual Rates of Transitions in Daily Cigarette Use Between Pregnant and Non-Pregnant Women
FU1-FU5

	Stop	Start	Both	Neither	H.S. Daily Smokers	% of Users Who Quit	H.S. Non-Smokers	% of Non-Users Who Started
Married Women								
Pregnant	14.0	3.5	11.2	71.3	25.3	55.6	74.7	4.6
Not Pregnant	8.0	6.3	16.3	69.4	24.3	32.9	75.7	8.3
Unmarried Women								
Pregnant	8.4	5.7	22.8	63.1	31.2	26.9	68.8	8.3
Not Pregnant	4.8	9.0	15.3	71.0	20.0	23.9	80.0	11.2
All Women								
Pregnant	13.0	3.9	13.4	69.7	26.4	49.2	73.6	5.3
Not Pregnant	5.8	8.2	15.6	70.5	21.4	27.0	78.7	10.4

Note: Because the pregnancy item was not added to the follow-up questionnaire until 1984, the n for this analysis is 19, 994.

Table 3.5
Actual Rates of Transitions in 1/2 Pack Cigarette Use Between Pregnant and Non-Pregnant Women
FU1-FU5

	Stop	Start	Both	Neither	H.S. 1/2 Pack Smokers	% of Users Who Quit	H.S. Non-Smokers	% of Non-Users Who Started
Married Women								
Pregnant	8.0	4.3	7.4	80.2	15.5	52.0	84.5	5.1
Not Pregnant	5.0	8.0	10.8	76.2	15.8	31.7	84.2	9.5
Unmarried Women								
Pregnant	5.9	4.9	16.9	72.3	22.8	25.7	77.2	6.7
Not Pregnant	3.0	8.7	9.1	79.2	12.1	24.9	87.9	9.9
All Women								
Pregnant	7.6	4.4	9.2	78.7	16.8	45.3	83.2	5.3
Not Pregnant	3.6	8.5	9.6	78.3	13.2	27.4	86.8	9.8

Note: Because the pregnancy item was not added to the follow-up questionnaire until 1984, the n for this analysis is 19, 994.

Table 4.1
Changes in Annual Alcohol Use Over Each BY-FU Interval by Sex and Endpoint of Interval

	Males						Females						Total
	FU1	FU2	FU3	FU4	FU5	Total	FU1	FU2	FU3	FU4	FU5	Total	
Modal Age	19-20	21-22	23-24	25-26	27-28		19-20	21-22	23-24	25-26	27-28		
Class years included:	76-88	76-86	76-84	76-82	76-80	76-88	76-88	76-86	76-84	76-82	76-80	76-88	76-88
Interval length (years)	1.478	3.471	5.466	7.457	9.438	4.404	1.478	3.470	5.464	7.459	9.441	4.387	4.395
Number of cases (Wtd.)	8,077	6,523	5,124	3,762	2,539	26026	9,732	7,787	6,045	4,471	3,008	31043	57069
Part A													
Mean change 12 month (-6 to +6)	.531	.824	.848	.779	.727	.722	.464	.628	.564	.473	.372	.517	.610
Base year mean (1-7)	4.500	4.565	4.627	4.652	4.637	4.577	3.942	3.991	4.012	4.033	4.025	3.989	4.257
Follow-up mean (1-7)	5.031	5.388	5.475	5.431	5.364	5.299	4.406	4.619	4.577	4.506	4.398	4.506	4.867
Part B													
Change patterns in use dichotomies													
Any in last 12 months													
BY=No, FU=No (%)	6.4	4.4	3.7	3.9	3.8	4.8	7.4	5.9	5.7	5.7	6.0	6.3	5.6
Base Year mean	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Follow-up mean	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
BY=Yes,FU=Yes (%)	84.8	85.5	85.3	84.8	83.9	85.0	81.8	82.3	81.8	80.7	79.1	81.5	83.1
Base Year mean	5.036	5.066	5.107	5.129	5.106	5.078	4.510	4.525	4.554	4.591	4.608	4.543	4.792
Follow-up mean	5.592	5.885	5.964	5.934	5.895	5.818	4.983	5.150	5.119	5.071	5.004	5.066	5.416
BY=No, FU=Yes (%)	5.5	6.9	7.0	6.6	6.6	6.4	7.0	7.9	8.0	8.1	8.2	7.7	7.1
Base Year mean	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Follow-up mean	3.462	4.052	4.465	4.713	4.888	4.166	3.137	3.569	3.589	3.761	3.812	3.504	3.775
BY=Yes, FU=No (%)	3.3	32.	4.0	4.7	5.6	3.8	3.8	3.9	4.5	5.6	6.7	4.5	4.2
Base Year mean	3.313	3.761	4.072	4.199	4.410	3.877	2.907	3.281	3.373	3.443	3.542	3.267	3.520
Follow-up mean	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Table 4.2
Changes in 2 Week Heavy Alcohol Use Over Each BY-FU Interval by Sex and Endpoint of Interval

	Males						Females						Total
	FU1	FU2	FU3	FU4	FU5	Total	FU1	FU2	FU3	FU4	FU5	Total	
Modal Age:	19-20	21-22	23-24	25-26	27-28		19-20	21-22	23-24	25-26	27-28		
Class years included:	76-88	76-86	76-84	76-82	76-80	76-88	76-88	76-86	76-84	76-82	76-80	76-88	76-88
Interval length (years)	1.478	3.471	5.466	7.457	9.438	4.404	1.478	3.470	5.464	7.459	9.441	4.387	4.395
Number of cases (Wtd.)	8,077	6,523	5,124	3,762	2,539	26026	9,732	7,787	6,045	4,471	3,008	31043	57069
Part A													
Mean change 30 day (-6 to +6)	.094	.140	-.017	-.162	-.260	.012	.056	.000	-.124	-.225	-.276	-.066	-.031
Base year mean (1-7)	2.102	2.136	2.158	2.165	2.158	2.136	1.587	1.599	1.610	1.606	1.616	1.600	1.842
Follow-up mean (1-7)	2.197	2.276	2.140	2.003	1.898	2.148	1.643	1.599	1.487	1.382	1.340	1.534	1.812
Part B													
Change patterns in use dichotomies													
5+ Drinks in last 2 weeks													
BY=Yes FU=No (%)	12.1	12.4	16.1	19.3	21.1	14.9	11.5	13.1	16.1	17.8	19.1	14.5	14.7
Base Year mean	2.945	3.116	3.165	3.150	3.212	3.103	2.839	2.926	2.979	2.983	3.028	2.939	3.014
Follow-up mean	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
BY=No, FU=Yes (%)	16.0	13.0	17.4	15.6	14.9	16.9	14.7	14.6	12.7	10.1	9.7	13.2	14.8
Base Year mean	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Follow-up mean	2.952	3.011	3.035	2.983	2.959	2.990	2.820	2.786	2.715	2.681	2.610	2.760	2.878
BY=Yes,FU=Yes (%)	34.9	35.5	32.8	30.2	27.6	33.2	17.2	15.9	13.2	11.0	9.9	14.5	23.0
Base Year mean	3.490	3.459	3.466	3.490	3.504	3.478	3.186	3.178	3.212	3.291	3.304	3.208	3.385
Follow-up mean	3.536	3.513	3.396	3.297	3.194	3.443	3.183	3.121	3.042	2.924	2.856	3.091	3.321
BY=No, FU=No (%)	37.1	33.0	33.7	34.9	36.4	35.0	56.6	56.4	58.0	61.[illegible]	61.3	57.9	47.6
Base Year mean	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Follow-up mean	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

TABLE 4.3[a]
REGRESSION ANALYSES LINKING POST HIGH SCHOOL EXPERIENCES TO CHANGES IN 30-DAY ALCOHOL USE--BY TO FU

	CHANGE SCORES					STOP	START	BOTH	NEITHER
VARIABLE	BIV. COEFF.	BKGD.	BKGD+ STUD/WORK	BKGD+ LIV.ARR.	ALL SETS	ALL SETS	ALL SETS	ALL SETS	ALL SETS
CONSTANT	0.297	0.297	0.297	0.297	0.297	0.090	0.158	0.609 #	0.143
BASE YEAR (76-88)	-0.008	-0.016 #	-0.018 #	-0.023 #	-0.023 #	0.004 #	0.000	-0.009 #	0.005 #
SET#1 GENDER									
FEMALE	-0.106	-0.119 #	-0.092 #	-0.063 #	-0.057 #	0.004	0.009 #	-0.028 #	0.015 #
MALE	0.125	0.140 #	0.108 #	0.074 #	0.067 #	-0.004	-0.011 #	0.033 #	-0.017 #
SET#2 RACE									
WHITE	-0.008	-0.021 #	-0.022 #	-0.024 #	-0.024 #	-0.002	-0.017 #	0.039 #	-0.021 #
BLACK	0.121	0.220 #	0.223 #	0.223 #	0.218 #	0.006	0.104 #	-0.248 #	0.139 #
OTHER	-0.067	-0.055	-0.047	-0.025	-0.024	0.012	0.041 #	-0.094 #	0.041 #
SET#3 REGION									
SOUTH	-0.095	-0.112 #	-0.109 #	-0.089 #	-0.089 #	0.017 #	-0.007	-0.046 #	0.036 #
NORTH EAST	0.066	0.048	0.042	0.018	0.016	-0.005	-0.014 #	0.064 #	-0.046 #
NORTH CENTRAL	-0.007	0.030	0.030	0.026	0.026	-0.012 #	0.004	0.033 #	-0.025 #
WEST	0.092	0.079 #	0.085 #	0.091 #	0.093 #	-0.001	0.029 #	-0.076 #	0.049 #
HS GRADE/D=1	0.092	0.073 #	0.065 #	0.060 #	0.060 #	-0.002	0.014 #	-0.028 #	0.016 #
R WL DO 4YR CLG	0.195	0.145 #	0.117 #	0.080 #	0.084 #	-0.008 #	0.004	0.014 #	-0.010 #
URBANICITY	0.079	0.034 #	0.029 #	0.021	0.021	-0.006 #	-0.002	0.025 #	-0.017 #
SET#4 FOLLOW UP #									
FU #1	-0.033	-0.015	-0.051 #	-0.125 #	-0.125 #	0.003	-0.026 #	0.010	0.013 #
FU #2	0.077	0.080 #	0.068 #	0.029	0.030	-0.003	0.006	0.002	-0.005
FU #3	0.022	0.013	0.043	0.056	0.056	-0.002	0.011	-0.004	-0.006
FU #4	-0.046	-0.068	-0.025	0.084 #	0.082 #	0.002	0.023 #	-0.017	-0.007
FU #5	-0.090	-0.126 #	-0.071	0.184 #	0.183 #	-0.002	0.032 #	-0.016	-0.015
SET#5 YEARS, BY TO FU#1									
ONE YEAR	-0.014	-0.012	-0.016	-0.027	-0.027	0.004	-0.007 #	0.003	-0.000
TWO YEARS	0.016	0.013	0.018	0.031	0.031	-0.005	0.009 #	-0.004	0.000
SET#6 FU STUDENT STATUS									
FULL-TIME STUDENT	0.238		0.129 #		-0.001	-0.002	0.006	0.002	-0.006
PART-TIME STUDENT	0.010		-0.034		-0.040	0.001	0.006	-0.011	0.003
NOT A STUDENT	-0.125		-0.062 #		0.007	0.001	-0.004	0.001	0.003
SET#7 FU WORK STATUS									
FULL-TIME CIVILIAN JOB	-0.037		0.035		0.009	-0.002	0.001	0.015 #	-0.013 #
MILITARY SERVICE	0.310		0.320 #		0.239 #	-0.007	0.054 #	-0.018	-0.029
PART-TIME CIVILIAN JOB	0.062		-0.042		-0.016	0.000	-0.002	-0.009	0.011
HOMEMAKER	-0.679		-0.473 #		-0.108	0.038 #	-0.006	-0.087 #	0.056 #
NONSTUDENT, NOT EMPLOYED	-0.256		-0.097		-0.060	0.012	-0.004	-0.053 #	0.045 #
OTHER	0.264		0.034		-0.011	-0.006	-0.007	0.006	0.007

VARIABLE	CHANGE SCORES BIV. COEFF.	BKGD.	BKGD+ STUD/WORK	BKGD+ LIV.ARR.	ALL SETS	STOP ALL SETS	START ALL SETS	BOTH ALL SETS	NEITHER ALL SETS
SET#8 FU LIVING ARRANGEMENTS									
MARRIED	-0.392			-0.260 #	-0.265 #	0.021 #	-0.009	-0.029 #	0.017 #
PARTNER	-0.045			-0.051	-0.051	-0.010	-0.034 #	0.120 #	-0.075 #
PARENT(S)	-0.021			-0.024	-0.014	0.000	-0.000	-0.028 #	0.027 #
DORMITORY	0.422			0.314 #	0.327 #	-0.014	0.039 #	-0.013	-0.013
LIVE ALONE	0.295			0.129 #	0.118	-0.013	0.030 #	0.012	-0.029 #
OTHER	0.392			0.289 #	0.274 #	-0.021 #	-0.005	0.069 #	-0.043 #
SET#9 FU PREGNANCY STATUS									
SPOUSE	-0.471			-0.296 #	-0.303 #	0.007	-0.030	-0.023	0.046
SELF	-1.246			-0.914 #	-0.908 #	0.295 #	-0.095 #	-0.317 #	0.108 #
NOT PREGNANT	0.045			0.032 #	0.032 #	-0.009 #	0.003 #	0.010 #	-0.004 #
SET#10 FU PARENTHOOD STATUS									
MARRIED FATHER	-0.440			-0.272 #	-0.282 #	0.024	-0.021	-0.013	0.010
MARRIED MOTHER	-0.737			-0.396 #	-0.363 #	0.061 #	-0.032 #	-0.046 #	0.017
SINGLE FATHER	0.278			0.215	0.213	-0.011	-0.014	0.076	-0.051
SINGLE MOTHER	-0.217			-0.163	-0.148	0.021	0.018	-0.032	-0.007
NOT A PARENT	0.105			0.059 #	0.056 #	-0.008 #	0.004 #	0.005 #	-0.001

VARIABLE	CHANGE SCORES ETA	BETA	BETA	BETA	BETA	STOP BETA	START BETA	BOTH BETA	NEITHER BETA
BASE YEAR (76-88)	-0.0152	-0.0310 #	-0.0343 #	-0.0427 #	-0.0436 #	0.0397 #	0.0017	-0.0555 #	0.0431 #
SET#1 GENDER	0.0695	0.0779 #	0.0602 #	0.0411 #	0.0371 #	0.0137	0.0282 #	0.0614 #	0.0453 #
SET#2 RACE	0.0260	0.0444 #	0.0448 #	0.0448 #	0.0438 #	0.0148	0.1038 #	0.1840 #	0.1394 #
SET#3 REGION	0.0431	0.0450 #	0.0444 #	0.0379 #	0.0383 #	0.0402 #	0.0385 #	0.1093 #	0.1087 #
BY C20 :R HS GRADE/D=1	0.1053	0.0835 #	0.0743 #	0.0692 #	0.0693 #	-0.0125	0.0724 #	-0.1101 #	0.0883 #
BY C21D:R WL DO 4YR CLG	0.1395	0.1037 #	0.0838 #	0.0575 #	0.0598 #	-0.0342 #	0.0144	0.0339 #	-0.0341 #
BY R :URBANICITY	0.0519	0.0225 #	0.0191 #	0.0138	0.0137	-0.0217 #	-0.0055	0.0545 #	-0.0524 #
SET#4 FOLLOW UP #	0.0325	0.0360 #	0.0327 #	0.0593 #	0.0591 #	0.0091	0.0557 #	0.0202	0.0275
SET#5 YEARS, BY TO FU#1	0.0089	0.0076	0.0104	0.0173	0.0173	0.0156	0.0219 #	0.0073	0.0001
SET#6 FU STUDENT STATUS	0.0991		0.0524 #		0.0080	0.0053	0.0132	0.0071	0.0111
SET#7 FU WORK STATUS	0.1157		0.0712 #		0.0303 #	0.0304 #	0.0274	0.0504 #	0.0563 #
SET#8 FU LIVING ARRANGEMENTS	0.1835			0.1271 #	0.1271 #	0.0537 #	0.0472 #	0.0942 #	0.0912 #
SET#9 FU PREGNANCY STATUS	0.1348			0.0977 #	0.0973 #	0.1762 #	0.0458 #	0.1115 #	0.0558 #
SET#10 FU PARENTHOOD STATUS	0.1568			0.0879 #	0.0831 #	0.0709 #	0.0315	0.0357 #	0.0224
R sqr.		0.0345 #	0.0407 #	0.0725 #	0.0734 #	0.0637 #	0.0269 #	0.1080 #	0.0718 #
R sqr., adjusted		0.0337	0.0397	0.0713	0.0719	0.0621	0.0253	0.1065	0.0702
R sqr., reg 2/3 - reg 1			0.0063 #	0.0381 #					
R sqr., reg 2/3 - reg 1, adjusted			0.0060	0.0376					
R sqr., reg 4 - reg 3/2			0.0009 #	0.0327 #					
R sqr., reg 4 - reg 3/2, adjusted			0.0005	0.0322					

NOTE: # indicates probability <.01

[A] See footnote to Table 3.3

TABLE 4.4^{a}
REGRESSION ANALYSES LINKING POST HIGH SCHOOL EXPERIENCES TO CHANGES IN 2 WEEK HEAVY ALCOHOL USE--BY TO FU

	CHANGE SCORES					STOP	START	BOTH	NEITHER
VARIABLE	BIV. COEFF.	BKGD.	BKGD+ STUD/WORK	BKGD+ LIV.ARR.	ALL SETS	ALL SETS	ALL SETS	ALL SETS	ALL SETS
CONSTANT	-0.036	-0.036	-0.036	-0.036	-0.036	0.147	0.147	0.231 #	0.475 #
BASE YEAR (76-88)	0.015	-0.003	-0.004	-0.007	-0.007	0.002	-0.002	-0.003 #	0.003 #
SET#1 GENDER									
FEMALE	-0.038	-0.046 #	-0.033 #	-0.033 #	-0.028 #	-0.002	-0.011 #	-0.068 #	0.082 #
MALE	0.044	0.054 #	0.039 #	0.039 #	0.033 #	0.002	0.013 #	0.081 #	-0.096 #
SET#2 RACE									
WHITE	-0.010	-0.014 #	-0.015 #	-0.015 #	-0.015 #	0.009 #	0.004 #	0.024 #	-0.037 #
BLACK	0.113	0.143 #	0.143 #	0.134 #	0.131 #	-0.066 #	-0.029 #	-0.156 #	0.250 #
OTHER	-0.041	-0.033	-0.027	-0.012	-0.011	-0.007	-0.004	-0.056 #	0.067 #
SET#3 REGION									
SOUTH	-0.006	-0.024	-0.022	-0.008	-0.008	-0.007	-0.008	-0.023 #	0.038 #
NORTH EAST	0.033	0.028	0.024	0.004	0.003	0.011	0.008	0.022 #	-0.041 #
NORTH CENTRAL	-0.017	0.009	0.007	0.005	0.006	0.000	0.010 #	0.033 #	-0.043 #
WEST	-0.005	-0.015	-0.010	-0.002	-0.001	-0.005	-0.015	-0.055 #	0.075 #
HS GRADE/D=1	0.058	0.048 #	0.041 #	0.039 #	0.038 #	-0.013 #	0.002	-0.029 #	0.040 #
R WL DO 4YR CLG	0.117	0.083 #	0.057 #	0.037 #	0.036 #	-0.006	0.004	-0.007	0.008
URBANICITY	0.035	0.011	0.009	0.002	0.002	-0.001	-0.000	0.007	-0.005
SET#4 FOLLOW UP #									
FU #1	0.090	0.092 #	0.053 #	-0.001	-0.008	-0.005	-0.010	0.023 #	-0.008
FU #2	0.074	0.074 #	0.063 #	0.041	0.039	-0.007	0.009	0.008	-0.009
FU #3	-0.056	-0.057 #	-0.024	-0.014	-0.008	0.008	0.005	-0.019 #	0.006
FU #4	-0.169	-0.171 #	-0.125 #	-0.060	-0.051	0.013	-0.004	-0.031 #	0.022
FU #5	-0.231	-0.236 #	-0.182 #	0.003	0.011	0.007	0.013	-0.033 #	0.013
SET#5 YEARS, BY TO FU#1									
ONE YEAR	0.006	0.008	0.002	-0.006	-0.007	0.004	-0.002	0.001	-0.002
TWO YEARS	-0.007	-0.009	-0.003	0.006	0.008	-0.004	0.003	-0.001	0.003
SET#6 FU STUDENT STATUS									
FULL-TIME STUDENT	0.235		0.092 #		0.008	-0.000	0.009	-0.012	0.003
PART-TIME STUDENT	-0.065		-0.064		-0.058	0.003	-0.015	-0.006	0.017
NOT A STUDENT	-0.112		-0.038 #		0.005	-0.000	-0.002	0.007	-0.004
SET#7 FU WORK STATUS									
FULL-TIME CIVILIAN JOB	-0.087		-0.015		-0.013	0.003	0.002	0.003	-0.008
MILITARY SERVICE	0.178		0.189 #		0.160 #	-0.012	0.044 #	-0.045 #	0.012
PART-TIME CIVILIAN JOB	0.088		-0.011		-0.007	0.001	-0.007	-0.004	0.011
HOMEMAKER	-0.330		-0.199 #		-0.048	-0.002	-0.016	-0.038	0.056 #
NONSTUDENT, NOT EMPLOYED	-0.119		-0.031		-0.020	-0.004	-0.000	-0.013	0.017
OTHER	0.290		0.098 #		0.045	-0.008	-0.002	0.022	-0.011

	CHANGE SCORES					STOP	START	BOTH	NEITHER
VARIABLE	BIV. COEFF.	BKGD.	BKGD+ STUD/WORK	BKGD+ LIV.ARR.	ALL SETS	ALL SETS	ALL SETS	ALL SETS	ALL SETS
SET#8 FU LIVING ARRANGEMENTS									
MARRIED	-0.328			-0.241 #	-0.238 #	0.044 #	-0.045 #	-0.041 #	0.043 #
PARTNER	-0.160			-0.152 #	-0.147 #	0.029 #	-0.003	0.073 #	-0.099 #
PARENT(S)	0.035			0.019	0.030	-0.017 #	-0.006	-0.011	0.034 #
DORMITORY	0.438			0.334 #	0.312 #	-0.041 #	0.076 #	-0.003	-0.032 #
LIVE ALONE	0.089			0.045	0.044	0.000	0.013	-0.001	-0.013
OTHER	0.266			0.218 #	0.204 #	-0.027 #	0.042 #	0.071 #	-0.086 #
SET#9 FU PREGNANCY STATUS									
SPOUSE	-0.524			-0.283 #	-0.285 #	0.043	-0.055 #	-0.015	0.024
SELF	-0.469			-0.249 #	-0.248 #	0.071 #	-0.083 #	-0.107 #	0.109 #
NOT PREGNANT	0.023			0.012 #	0.012 #	-0.003 #	0.003 #	0.003 #	-0.004 #
SET#10 FU PARENTHOOD STATUS									
MARRIED FATHER	-0.483			-0.219 #	-0.224 #	0.041 #	-0.024	-0.029	0.011
MARRIED MOTHER	-0.361			-0.058	-0.052	0.021	-0.025	-0.023	0.027
SINGLE FATHER	0.101			0.087	0.089	-0.009	0.043	0.057	-0.090 #
SINGLE MOTHER	-0.085			-0.068	-0.063	0.046 #	0.016	-0.009	-0.052
NOT A PARENT	0.068			0.020 #	0.020 #	-0.006 #	0.003	0.004	-0.001

	CHANGE SCORES					STOP	START	BOTH	NEITHER
VARIABLE	ETA	BETA	BETA	BETA	BETA	BETA	BETA	BETA	BETA
BASE YEAR (76-88)	0.0333	-0.0062	-0.0084	-0.0155	-0.0159	0.0151	-0.0181	-0.0225 #	0.0212 #
SET#1 GENDER	0.0299	0.0363 #	0.0259 #	0.0260 #	0.0225 #	0.0059	0.0341 #	0.1766 #	0.1776 #
SET#2 RACE	0.0282	0.0349 #	0.0349 #	0.0326 #	0.0319 #	0.0624 #	0.0274 #	0.1332 #	0.1753 #
SET#3 REGION	0.0139	0.0152	0.0129	0.0041	0.0040	0.0195	0.0281 #	0.0777 #	0.0955 #
HS GRADE/D=1	0.0805	0.0667 #	0.0573 #	0.0539 #	0.0530 #	-0.0695 #	0.0081	-0.1301 #	0.1531 #
R WL DO 4YR CLG	0.1014	0.0716 #	0.0496 #	0.0323 #	0.0311 #	-0.0190	0.0142	-0.0187	0.0186
URBANICITY	0.0278	0.0091	0.0074	0.0018	0.0020	-0.0038	-0.0014	0.0174	-0.0109
SET#4 FOLLOW UP #	0.0817	0.0831 #	0.0595 #	0.0224	0.0204	0.0223	0.0245	0.0519 #	0.0224
SET#5 YEARS, BY TO FU#1	0.0049	0.0060	0.0019	0.0043	0.0052	0.0118	0.0072	0.0022	0.0051
SET#6 FU STUDENT STATUS	0.1157		0.0456 #		0.0136	0.0031	0.0197	0.0203	0.0130
SET#7 FU WORK STATUS	0.1129		0.0479 #		0.0261	0.0125	0.0258	0.0339 #	0.0299 #
SET#8 FU LIVING ARRANGEMENTS	0.1852			0.1412 #	0.1359 #	0.0894 #	0.1083 #	0.0970 #	0.1062 #
SET#9 FU PREGNANCY STATUS	0.0777			0.0415 #	0.0416 #	0.0379 #	0.0452 #	0.0437 #	0.0381 #
SET#10 FU PARENTHOOD STATUS	0.1200			0.0417 #	0.0418 #	0.0403 #	0.0303	0.0279	0.0306 #
R sqr		0.0217 #	0.0260 #	0.0439 #	0.0446 #	0.0306 #	0.0266 #	0.1056 #	0.1270 #
R sqr., adjusted		0.0209	0.0249	0.0426	0.0430	0.0290	0.0250	0.1041	0.1256
R sqr., reg 2/3 - reg 1			0.0043 #	0.0222 #					
R sqr., reg 2/3 - reg 1, adjusted			0.0039	0.0217					
R sqr., reg 4 - reg 3/2			0.0007	0.0187 #					
R sqr., reg 4 - reg 3/2, adjusted			0.0004	0.0182					

NOTE: # indicates probability <.01

[A] See footnote to Table 3.3

Table 4.5
Actual Rates of Transitions in 30 Day Alcohol Use Between Pregnant and Non-Pregnant Women
FU1-FU5

	Stop	Start	Both	Neither	H.S. 30-day Users	% of Users Who Quit	H.S. Non-Users	% of Non-Users Who Started
Married Women								
Pregnant	45.4	5.4	19.7	29.5	65.1	69.7	34.9	15.4
Not Pregnant	14.5	15.7	50.8	19.0	65.3	22.2	34.7	45.2
Unmarried Women								
Pregnant	40.5	8.4	22.1	28.9	62.6	64.7	37.4	22.5
Not Pregnant	7.5	18.7	58.2	15.5	65.7	11.5	34.3	54.7
All Women								
Pregnant	44.5	5.9	20.2	29.4	64.6	68.8	35.4	16.8
Not Pregnant	9.7	17.8	55.9	16.6	65.6	14.8	34.4	51.7

Note: Because the pregnancy item was not added to the follow-up questionnaire until 1984, the n for this analysis is 19, 276.

Table 4.6
Actual Rates of Transitions in 5+ Drinks in Past 2 weeks Between Pregnant and Non-Pregnant Women
FU1-FU5

	Stop	Start	Both	Neither	H.S. Heavy Users	% of Users Who Quit	H.S. Non-Users	% of Non-Users Who Started
Married Women								
Pregnant	28.0	0.8	0.6	70.7	28.6	98.0	71.4	1.1
Not Pregnant	20.4	7.1	9.1	63.5	29.4	69.2	70.6	10.0
Unmarried Women								
Pregnant	24.3	1.4	3.5	70.7	27.8	87.4	72.2	2.0
Not Pregnant	12.3	15.7	16.5	55.6	28.8	42.7	71.2	22.0
All Women								
Pregnant	27.3	0.9	1.1	70.7	28.4	96.1	71.6	1.2
Not Pregnant	14.8	13.0	14.2	58.0	29.0	51.0	71.0	18.3

Note: Because the pregnancy item was not added to the follow-up questionnaire until 1984, the n for this analysis is 19, 276.

Table 5.1
Changes in Annual Marijuana Use Over Each BY-FU Interval by Sex and Endpoint of Interval

	Males						Females						Total
	FU1	FU2	FU3	FU4	FU5	Total	FU1	FU2	FU3	FU4	FU5	Total	
Modal Age:	19-20	21-22	23-24	25-26	27-28		19-20	21-22	23-24	25-26	27-28		
Class years included:	76-88	76-86	76-84	76-82	76-80	76-88	76-88	76-86	76-84	76-82	76-80	76-88	76-88
Interval length (years)	1.478	3.471	5.466	7.457	9.438	4.404	1.478	3.470	5.464	7.459	9.441	4.387	4.395
Number of cases (Wtd.)	8,077	6,523	5,124	3,762	2,539	26026	9,732	7,787	6,045	4,471	3,008	31043	57069
Part A													
Mean change 12 month (-6 to +6)	.107	.077	-.168	-.416	-.649	-.104	.036	-.123	-.325	-.540	-.709	-.230	-.173
Base year mean (1-7)	2.567	2.672	2.770	2.883	2.966	2.718	2.208	2.305	2.368	2.441	2.473	2.323	2.502
Follow-up mean (1-7)	2.674	2.749	2.602	2.467	2.317	2.614	2.245	2.182	2.044	1.901	1.764	2.093	2.329
Part B													
Change patterns in use dichotomies													
Any in last 12 months													
BY=Yes, FU=No (%)	10.5	13.0	17.0	20.0	24.0	15.1	9.9	14.6	18.6	21.7	24.0	15.8	15.5
Base Year mean	3.396	3.755	3.832	4.072	4.232	3.830	3.260	3.542	3.744	3.875	4.047	3.673	3.742
Follow-up mean	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
BY=No, FU=Yes (%)	10.8	12.6	11.2	9.4	7.6	10.8	10.8	.2.1	10.5	8.3	6.4	10.3	10.5
Base Year mean	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Follow-up mean	3.504	3.686	3.684	3.700	4.226	3.668	3.262	3.405	3.493	3.506	3.609	3.399	3.525
BY=Yes,FU=Yes (%)	33.9	33.2	31.0	29.9	26.7	31.9	28.5	25.5	22.2	20.0	17.6	24.2	27.7
Base Year mean	4.886	4.954	5.157	5.231	5.455	5.049	4.454	4.674	4.872	5.093	5.210	4.716	4.890
Follow-up mean	5.144	5.242	5.190	5.050	5.014	5.155	4.511	4.503	4.538	4.474	4.397	4.500	4.842
BY=No, FU=No (%)	44.9	41.1	40.8	40.6	41.7	42.2	50.8	47.9	48.7	50.0	52.0	49.7	46.3
Base Year mean	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Follow-up mean	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Table 5.2
Changes in 30 Day Marijuana Use Over Each BY-FU Interval by Sex and Endpoint of Interval

	Males						Females						Total
	FU1	FU2	FU3	FU4	FU5	Total	FU1	FU2	FU3	FU4	FU5	Total	
Modal Age:	19-20	21-22	23-24	25-26	27-28		19-20	21-22	23-24	25-26	27-28		
Class years included:	76-88	76-86	76-84	76-82	76-80	76-88	76-88	76-86	76-84	76-82	76-80	76-88	76-88
Interval length (years)	1.478	3.471	5.466	7.457	9.438	4.404	1.478	3.470	5.464	7.459	9.441	4.387	4.395
Number of cases (Wtd.)	3,077	6,523	5,124	3,762	2,539	26026	9,732	7,787	6,045	4,471	3,008	31043	57069
Part A													
Mean change 30 days (-6 to +6)	.021	-.024	-.179	-.358	-.496	-.135	-.019	-.109	-.201	-.332	-.444	-.163	-.151
Base year mean (1-7)	1.881	1.963	2.026	2.113	2.187	1.993	1.593	1.653	1.694	1.756	1.793	1.671	1.817
Follow-up mean (1-7)	1.901	1.939	1.847	1.755	1.691	1.858	1.575	1.543	1.493	1.424	1.349	1.507	1.666
Part B													
Change patterns in use dichotomies													
Any in last 30 days													
BY=Yes FU=No (%)	9.8	11.9	14.8	17.8	21.0	13.6	9.5	12.9	14.9	17.5	19.2	13.5	13.5
Base Year mean	3.183	3.447	3.502	3.659	3.805	3.494	2.977	3.162	3.264	3.369	3.523	3.232	3.351
Follow-up mean	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
BY=No, FU=Yes (%)	9.8	11.2	9.8	7.3	7.2	9.5	9.1	9.3	7.7	5.8	4.5	7.9	8.7
Base Year mean	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Follow-up mean	3.156	3.341	3.336	3.499	3.522	3.312	2.883	3.027	3.265	3.341	3.447	3.077	3.194
BY=Yes,FU=Yes (%)	19.8	19.3	18.3	17.5	.5.5	18.6	13.7	12.0	11.0	10.1	9.0	11.8	14.9
Base Year mean	4.377	4.473	4.592	4.666	4.866	4.522	3.955	4.104	4.245	4.369	4.439	4.133	4.353
Follow-up mean	4.492	4.500	4.390	4.286	4.296	4.430	3.941	3.953	3.888	3.860	3.664	3.904	4.202
BY=No, FU=No (%)	60.7	57.5	57.2	57.5	56.3	58.3	67.7	65.8	66.4	66.6	62.3	66.8	62.9
Base Year mean	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Follow-up mean	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

TABLE 5.3[a]
REGRESSION ANALYSES LINKING POST HIGH SCHOOL EXPERIENCES TO CHANGES IN 30-DAY MARIJUANA USE--BY TO FU

VARIABLE	CHANGE SCORES					STOP	START	BOTH	NEITHER
	BIV. COEFF.	BKGD.	BKGD+ STUD/WORK	BKGD+ LIV.ARR.	ALL SETS	ALL SETS	ALL SETS	ALL SETS	ALL SETS
CONSTANT	-0.151	-0.151	-0.151	-0.151	-0.151	0.135	0.085	0.147	0.633 #
BASE YEAR (76-88)	0.006	-0.017 #	-0.017 #	-0.020 #	-0.019 #	0.001	-0.007 #	-0.014 #	0.021 #
SET#1 GENDER									
FEMALE	-0.012	-0.021	-0.026 #	-0.017	-0.025	0.004	-0.003	-0.026 #	0.025 #
MALE	0.014	0.025	0.031 #	0.020	0.030	-0.005	0.004	0.031 #	-0.030 #
SET#2 RACE									
WHITE	-0.009	-0.013 #	-0.014 #	-0.014 #	-0.015 #	0.007 #	0.001	0.006 #	-0.014 #
BLACK	0.106	0.119 #	0.127 #	0.117 #	0.126 #	-0.041 #	-0.003	-0.034 #	0.079 #
OTHER	-0.040	-0.012	-0.012	-0.001	-0.001	-0.021	-0.005	-0.023 #	0.050 #
SET#3 REGION									
SOUTH	0.068	0.033	0.034	0.043 #	0.042	-0.016 #	-0.002	-0.016 #	0.035 #
NORTH EAST	-0.100	-0.078 #	-0.080 #	-0.091 #	-0.089 #	0.025 #	0.005	0.017 #	-0.047 #
NORTH CENTRAL	-0.004	0.014	0.013	0.012	0.011	-0.002	-0.001	0.001	0.002
WEST	0.031	0.030	0.033	0.034	0.035	-0.005	-0.001	0.002	0.003
HS GRADES/D=1	0.069	0.059 #	0.057 #	0.055 #	0.055 #	-0.019 #	-0.003	-0.019 #	0.041 #
WILL DO 4YR CLG	0.098	0.073 #	0.064 #	0.050 #	0.051 #	-0.001	0.005 #	-0.009 #	0.004
URBANICITY	-0.043	-0.052 #	-0.053 #	-0.057 #	-0.056 #	0.015 #	0.002	0.021 #	-0.039 #
SET#4 FOLLOW UP #									
FU #1	0.127	0.152 #	0.143 #	0.110 #	0.120 #	-0.020 #	0.012 #	0.044 #	-0.036 #
FU #2	0.057	0.062 #	0.060 #	0.043	0.044	-0.004	0.010 #	0.005	-0.011
FU #3	-0.060	-0.072 #	-0.065 #	-0.056 #	-0.063 #	0.011	-0.005	-0.030 #	0.024 #
FU #4	-0.197	-0.227 #	-0.217 #	-0.173 #	-0.183 #	0.024 #	-0.028 #	-0.046 #	0.050 #
FU #5	-0.284	-0.331 #	-0.319 #	-0.210 #	-0.221 #	0.035 #	-0.028 #	-0.062 #	0.054 #
SET#5 YEARS, BY TO FU#1									
ONE YEAR	0.017	0.021	0.020	0.015	0.016	-0.001	0.001	0.007 #	-0.006
TWO YEARS	-0.020	-0.024	-0.022	-0.017	-0.019	0.002	-0.001	-0.008 #	0.007
SET#6 FU STUDENT STATUS									
FULL-TIME STUDENT	0.182		0.024		-0.020	-0.000	-0.002	-0.022 #	0.024 #
PART-TIME STUDENT	-0.052		-0.032		-0.031	-0.000	-0.002	-0.002	0.004
NOT A STUDENT	-0.086		-0.007		0.015	0.000	0.001	0.012 #	-0.013 #
SET#7 FU WORK STATUS									
FULL-TIME CIVILIAN JOB	-0.055		0.011		0.008	-0.000	0.001	0.001	-0.002
MILITARY SERVICE	-0.351		-0.362 #		-0.398 #	0.090 #	-0.056 #	-0.121 #	0.087 #
PART-TIME CIVILIAN JOB	0.095		0.012		0.020	-0.006	0.002	0.008	-0.004
HOMEMAKER	-0.183		-0.077		0.025	-0.015	-0.011	-0.014	0.040
NONSTUDENT, NOT EMPLOYED	-0.047		0.006		0.017	0.002	0.001	0.021	-0.023
OTHER	0.208		0.038		0.014	-0.005	0.008	0.006	-0.009

VARIABLE	CHANGE SCORES					STOP	START	BOTH	NEITHER
	BIV. COEFF.	BKGD.	BKGD+ STUD/WORK	BKGD+ LIV.ARR.	ALL SETS	ALL SETS	ALL SETS	ALL SETS	ALL SETS
SET#8 FU LIVING ARRANGEMENTS									
MARRIED	-0.230			-0.108 #	-0.104 #	0.019 #	-0.024 #	-0.021 #	0.027 #
PARTNER	0.044			0.070	0.065	0.022	0.037 #	0.124 #	-0.183 #
PARENT(S)	0.017			-0.010	-0.026	-0.013 #	-0.015 #	-0.023 #	0.051 #
DORMITORY	0.306			0.132 #	0.127 #	-0.024 #	0.030 #	-0.013	0.007
LIVE ALONE	0.068			0.042	0.052	0.003	0.019	0.004	-0.025
OTHER	0.145			0.093 #	0.119 #	-0.001	0.036 #	0.048 #	-0.083 #
SET#9 FU PREGNANCY STATUS									
SPOUSE	-0.261			-0.100	-0.092	0.014	-0.008	-0.021	0.011
SELF	-0.312			-0.191 #	-0.198 #	0.034	-0.046 #	-0.062 #	0.063 #
NOT PREGNANT	0.014			0.007 #	0.007 #	-0.001	0.002 #	0.002 #	-0.002 #
SET#10 FU PARENTHOOD STATUS									
MARRIED FATHER	-0.375			-0.198 #	-0.193 #	0.037 #	-0.015	-0.020	-0.003
MARRIED MOTHER	-0.279			-0.071	-0.083	0.029 #	-0.009	-0.017	-0.003
SINGLE FATHER	-0.009			-0.026	-0.027	0.028	0.015	0.071 #	-0.114 #
SINGLE MOTHER	-0.023			-0.011	-0.019	0.020	0.020	-0.011	-0.029
NOT A PARENT	0.052			0.020 #	0.021 #	-0.006 #	0.001	0.002	0.003

VARIABLE	CHANGE SCORES					STOP	START	BOTH	NEITHER
	ETA	BETA	BETA	BETA	BETA	BETA	BETA	BETA	BETA
BASE YEAR (76-88)	0.0131	-0.0367 #	-0.0362 #	-0.0417 #	-0.0402 #	0.0052	-0.0754 #	-0.1275 #	0.1336 #
SET#1 GENDER	0.0086	0.0154	0.0192 #	0.0124	0.0187	0.0129	0.0135	0.0793 #	0.0574 #
SET#2 RACE	0.0246	0.0268 #	0.0285 #	0.0265 #	0.0283 #	0.0460 #	0.0067	0.0394 #	0.0650 #
SET#3 REGION	0.0425	0.0301 #	0.0309 #	0.0356 #	0.0351 #	0.0452 #	0.0096	0.0350 #	0.0623 #
R HS GRADE/D=1	0.0882	0.0761 #	0.0731 #	0.0705 #	0.0706 #	-0.1064 #	-0.0171	-0.1027 #	0.1604 #
R WL DO 4YR CLG	0.0781	0.0581 #	0.0516 #	0.0399 #	0.0410 #	-0.0018	0.0232 #	-0.0294 #	0.0091
URBANICITY	-0.0313	-0.0381 #	-0.0390 #	-0.0418 #	-0.0411 #	0.0488 #	0.0075	0.0648 #	-0.0865 #
SET#4 FOLLOW UP #	0.0910	0.1065 #	0.1014 #	0.0754 #	0.0807 #	0.0528 #	0.0551 #	0.1057 #	0.0697 #
SET#5 YEARS, BY TO FU#1	0.0125	0.0152	0.0142	0.0110	0.0119	0.0044	0.0037	0.0208 #	0.0143
SET#6 FU STUDENT STATUS	0.0829		0.0119		0.0125	0.0008	0.0051	0.0431 #	0.0347 #
SET#7 FU WORK STATUS	0.0826		0.0455 #		0.0479 #	0.0480 #	0.0379 #	0.0627 #	0.0383 #
SET#8 FU LIVING ARRANGEMENTS	0.1140			0.0564 #	0.0593 #	0.0458 #	0.0907 #	0.1121 #	0.1338 #
SET#9 FU PREGNANCY STATUS	0.0432			0.0239 #	0.0244 #	0.0178	0.0286 #	0.0313 #	0.0225 #
SET#10FU PARENTHOOD STATUS	0.0856			0.0354 #	0.0361 #	0.0405 #	0.0199	0.0295 #	0.0280 #
R sqr.		0.0238 #	0.0261 #	0.0294 #	0.0316 #	0.0331 #	0.0202 #	0.0647 #	0.0843 #
R sqr., adjusted		0.0231	0.0250	0.0282	0.0300	0.0315	0.0186	0.0632	0.0828
R sqr., reg 2/3 - reg 1			0.0023 #	0.0056 #					
R sqr., reg 2/3 - reg 1, adjusted			0.0019	0.0051					
R sqr., reg 4 - reg 3/2			0.0022 #	0.0055 #					
R sqr., reg 4 - reg 3/2, adjustec			0.0018	0.0050					

NOTE: # indicates probability < .01

^ See footnote to Table 3.3

TABLE 5.4[a]

REGRESSION ANALYSES LINKING POST HIGH SCHOOL EXPERIENCES TO CHANGES IN ANNUAL MARIJUANA USE--BY TO FU

	CHANGE SCORES				
VARIABLE	BIV. COEFF.	BKGD.	BKGD+ STUD/WORK	BKGD+ LIV.ARR.	ALL SETS
CONSTANT	-0.190	-0.190	-0.190	-0.190	-0.190
BASE YEAR (76-88)	0.009	-0.029 #	-0.029 #	-0.034 #	-0.033 #
SET#1 GENDER					
FEMALE	-0.050	-0.061 #	-0.066 #	-0.043 #	-0.057 #
MALE	0.059	0.072 #	0.078 #	0.051 #	0.067 #
SET#2 RACE					
WHITE	-0.013	-0.019 #	-0.021 #	-0.021 #	-0.022 #
BLACK	0.138	0.160 #	0.174 #	0.155 #	0.169 #
OTHER	-0.036	0.001	0.003	0.022	0.020
SET#3 REGION					
SOUTH	0.080	0.034	0.036	0.054	0.053
NORTH EAST	-0.108	-0.082 #	-0.086 #	-0.110 #	-0.107 #
NORTH CENTRAL	0.001	0.028	0.026	0.026	0.024
WEST	0.012	0.006	0.013	0.015	0.017
HS GRADE/D=1	0.089	0.080 #	0.074 #	0.072 #	0.071 #
R WL DO 4YR CLG	0.133	0.097 #	0.075 #	0.052 #	0.050 #
URBANICITY	-0.048	-0.063 #	-0.067 #	-0.075 #	-0.074 #
SET#4 FOLLOW UP #					
FU #1	0.211	0.252 #	0.225 #	0.153 #	0.164 #
FU #2	0.102	0.110 #	0.104 #	0.072 #	0.073 #
FU #3	-0.116	-0.137 #	-0.115 #	-0.094 #	-0.102 #
FU #4	-0.321	-0.371 #	-0.341 #	-0.249 #	-0.260 #
FU #5	-0.463	-0.541 #	-0.504 #	-0.274 #	-0.288 #
SET#5 YEARS, BY TO FU#1					
ONE YEAR	0.028	0.036 #	0.032	0.022	0.023
TWO YEARS	-0.032	-0.041 #	-0.036	-0.025	-0.027
SET#6 FU STUDENT STATUS					
FULL-TIME STUDENT	0.307		0.076		-0.009
PART-TIME STUDENT	-0.084		-0.051		-0.050
NOT A STUDENT	-0.147		-0.032		0.012
SET#7 FU WORK STATUS					
FULL-TIME CIVILIAN JOB	-0.087		0.020		0.010
MILITARY SERVICE	-0.582		-0.615 #		-0.664 #
PART-TIME CIVILIAN JOB	0.151		0.017		0.029
HOMEMAKER	-0.405		-0.215 #		0.018
NONSTUDENT, NOT EMPLOYED	-0.056		0.030		0.046
OTHER	0.361		0.083		0.040

	CHANGE SCORES				
VARIABLE	BIV. COEFF.	BKGD.	BKGD+ STUD/WORK	BKGD+ LIV.ARR.	ALL SETS
SET#8 FU LIVING ARRANGEMENTS					
MARRIED	-0.426			-0.249 #	-0.235 #
PARTNER	0.093			0.126	0.120
PARENT(S)	0.065			0.018	-0.007
DORMITORY	0.521			0.292 #	0.261 #
LIVE ALONE	0.073			0.028	0.048
OTHER	0.243			0.170 #	0.211 #
SET#9 FU PREGNANCY STATUS					
SPOUSE	-0.377			-0.125	-0.111
SELF	-0.402			-0.126	-0.135
NOT PREGNANT	0.018			0.006	0.006
SET#10 FU PARENTHOOD STATUS					
MARRIED FATHER	-0.579			-0.277 #	-0.270 #
MARRIED MOTHER	-0.582			-0.211 #	-0.226 #
SINGLE FATHER	0.117			0.059	0.058
SINGLE MOTHER	-0.116			-0.104	-0.114
NOT A PARENT	0.097			0.041 #	0.042 #

	CHANGE SCORES				
VARIABLE	ETA.	BETA.	BETA	BETA	BETA
BASE YEAR (76-88)	0.0141	-0.0470 #	-0.0468 #	-0.0544 #	-0.0525 #
SET#1 GENDER	0.0278	0.0342 #	0.0371 #	0.0240 #	0.0317 #
SET#2 RACE	0.0239	0.0275 #	0.0299 #	0.0272 #	0.0295 #
SET#3 REGION	0.0354	0.0241	0.0251 #	0.0327 #	0.0319 #
R HS GRADE/D=1	0.0871	0.0786 #	0.0726 #	0.0707 #	0.0699 #
WL DO 4YR CLG	0.0811	0.0594 #	0.0457 #	0.0314 #	0.0303 #
URBANICITY	-0.0270	-0.0353 #	-0.0371 #	-0.0419 #	-0.0411 #
SET#4 FOLLOW UP #	0.1150	0.1345 #	0.1225 #	0.0810 #	0.0855 #
SET#5 YEARS, BY TO FU#1	0.0156	0.0196 #	0.0174	0.0121	0.0128
SET#6 FU STUDENT STATUS	0.1066		0.0264		0.0094
SET#7 FU WORK STATUS	0.1088		0.0625 #		0.0609 #
SET#8 FU LIVING ARRANGEMENTS	0.1553			0.0925 #	0.0907 #
SET#9 FU PREGNANCY STATUS	0.0439			0.0140	0.0141
SET#10 FU PARENTHOOD STATUS	0.1197			0.0498 #	0.0512 #
R sqr.		0.0301 #	0.0349 #	0.0416 #	0.0451 #
R sqr., adjusted		0.0294	0.0338	0.0404	0.0436
R sqr., reg 2/3 - reg 1			0.0048 #	0.0115 #	
R sqr., reg 2/3 - reg 1, adjusted			0.0045	0.0110	
R sqr., reg 4 - reg 3/2			0.0035 #	0.0102 #	
R sqr., reg 4 - reg 3/2, adjusted			0.0032	0.0097	

NOTE: # indicates probability <.01

^ See footnote to Table 3.3

Table 5.5
Actual Rates of Transitions in 30 Day Marijuana Use Between Pregnant and Non-Pregnant Women
FU1-FU5

	Stop	Start	Both	Neither	H.S. Annual Users	% of Users Who Quit	H.S. Non-Users	% of Non-Users Who Started
Married Women								
Pregnant								
Actual	20.9	0.7	3.6	74.7	24.6	85.2	75.4	0.9
Not Pregnant								
Actual	17.3	4.2	8.4	70.1	25.7	67.3	74.3	5.6
Unmarried Women								
Pregnant								
Actual	21.2	2.6	6.4	69.7	27.6	76.8	72.4	3.6
Not Pregnant								
Actual	12.7	8.4	10.6	68.3	23.3	54.4	76.7	10.9
All Women								
Pregnant								
Actual	21.0	1.1	4.2	73.8	25.2	83.4	74.8	1.4
Not Pregnant								
Actual	14.1	7.1	9.9	68.9	24.0	58.7	76.0	9.3

Note: Because the pregnancy item was not added to the follow-up questionnaire until 1984, the n for this analysis is 19, 906.

Table 6.1
Changes in Annual Cocaine Use Over Each BY-FU Interval by Sex and Endpoint of Interval

	Males						Females						Total
	FU1	FU2	FU3	FU4	FU5	Total	FU1	FU2	FU3	FU4	FU5	Total	
Modal Age:	19-20	21-22	23-24	25-26	27-28		19-20	21-22	23-24	25-26	27-28		
Class years included:	76-88	76-86	76-84	76-82	76-80	76-88	76-88	76-86	76-84	76-82	76-80	76-88	76-88
Interval length (years)	1.478	3.471	5.466	7.457	9.438	4.404	1.478	3.470	5.464	7.459	9.441	4.387	4.395
Number of cases (Wtd.)	8,077	6,523	5,124	3,762	2,539	26026	9,732	7,787	6,045	4,471	3,008	31043	57069
Part A													
Mean change 12 month (-6 to +6)	.133	.304	.366	.359	.322	.273	.101	.202	.232	.200	.171	.173	.218
Base year mean (1-7)	1.219	1.229	1.217	1.217	1.195	1.219	1.158	1.159	1.141	1.132	1.109	1.147	1.179
Follow-up mean (1-7)	1.352	1.533	1.583	1.576	1.517	1.491	1.259	1.361	1.373	1.332	1.280	1.319	1.397
Part B Change patterns in use dichotomies													
Any in last 12 months													
BY=Yes, FU=No (%)	3.6	4.0	4.3	4.9	5.2	4.2	2.8	3.2	3.3	3.6	3.3	3.2	3.6
Base Year mean	2.894	2.948	2.876	3.011	2.937	2.928	2.800	2.917	2.915	2.929	2.790	2.873	2.902
Follow-up mean	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
BY=No, FU=Yes (%)	8.6	14.6	.6.9	16.3	15.2	13.5	6.7	10.7	11.6	10.4	9.2	9.4	11.3
Base Year mean	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Follow-up mean	2.960	3.249	3.326	3.460	3.531	3.279	2.975	3.235	3.364	3.370	3.317	3.237	3.260
BY=Yes,FU=Yes (%)	6.8	6.9	6.5	5.9	4.8	6.4	4.7	4.3	3.6	3.0	2.5	3.9	5.1
Base Year mean	3.226	3.196	3.121	3.025	2.977	3.152	3.315	3.280	3.154	3.128	3.032	3.239	3.189
Follow-up mean	3.710	3.952	3.960	3.989	3.783	3.867	3.725	3.824	3.766	3.846	3.732	3:774	3.827
BY=No, FU=No (%)	81.1	74.5	72.4	73.0	74.9	76.0	85.9	81.8	81.5	83.0	85.1	83.5	80.1
Base Year mean	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Follow-up mean	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Table 6.2
Changes in 30 Day Cocaine Use Over Each BY-FU Interval by Sex and Endpoint of Interval

	Males						Females						Total
	FU1	FU2	FU3	FU4	FU5	Total	FU1	FU2	FU3	FU4	FU5	Total	
Modal Age:	19-20	21-22	23-24	25-26	27-28		19-20	21-22	23-24	25-26	27-28		
Class years included:	76-88	76-86	76-84	76-82	76-80	76-88	76-88	76-86	76-84	76-82	76-80	76-88	76-88
Interval length (years)	1.478	3.471	5.466	7.457	9.438	4.404	1.478	3.470	5.464	7.459	9.441	4.387	4.395
Number of cases (Wtd.)	8,077	6,523	5,124	3,762	2,539	26026	9,732	7,787	6,045	4,471	3,008	31043	57069
Part A													
Mean change 30 day (-6 to +6)	.031	.075	.086	.094	.070	.066	.026	.045	.063	.045	.031	.041	.052
Base year mean (1-7)	1.080	1.084	1.076	1.076	1.069	1.079	1.053	1.053	1.047	1.046	1.038	1.050	1.063
Follow-up mean (1-7)	1.111	1.159	1.162	1.170	1.139	1.144	1.079	1.098	1.110	1.091	1.069	1.091	1.115
Part B													
Change patterns in use dichotomies													
Any in last 30 days													
BY=Yes FU=No (%)	2.7	3.1	3.0	3.2	3.1	2.9	1.9	2.2	2.0	2.1	1.8	2.0	2.4
Base Year mean	2.725	2.689	2.720	2.655	2.695	2.701	2.594	2.626	2.589	2.637	2.701	2.617	2.663
Follow-up mean	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
BY=No, FU=Yes (%)	4.8	7.8	8.3	8.3	7.0	7.0	3.5	4.7	5.6	4.6	3.9	4.4	5.6
Base Year mean	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Follow-up mean	2.581	2.603	2.618	2.749	2.714	2.638	2.591	2.649	2.706	2.746	2.583	2.658	2.647
BY=Yes,FU=Yes (%)	1.9	1.8	1.5	1.3	1.0	1.6	1.2	1.1	0.8	0.7	0.5	1.0	1.2
Base Year mean	2.851	2.833	2.705	2.897	2.800	2.822	2.886	2.697	2.723	2.714	2.500	2.769	2.799
Follow-up mean	2.917	2.945	2.848	2.963	3.029	2.924	2.943	2.859	2.716	2.648	2.659	2.836	2.887
BY=No, FU=No (%)	90.7	87.4	87.2	87.3	89.0	88.5	93.4	92.0	91.5	92.6	93.9	92.6	90.8
Base Year mean	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Follow-up mean	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

TABLE 6.3^{A}

REGRESSION ANALYSES LINKING POST HIGH SCHOOL EXPERIENCES TO CHANGES IN 30-DAY COCAINE USE--BY TO FU

	CHANGE SCORES					STOP	START	BOTH	NEITHER
VARIABLE	BIV. COEFF.	BKGD.	BKGD+ STUD/WORK	BKGD+ LIV.ARR.	ALL SETS	ALL SETS	ALL SETS	ALL SETS	ALL SETS
CONSTANT	0.051	0.051	0.051	0.051	0.051	0.025	0.056	0.013	0.907 #
BASE YEAR (76-88)	-0.011	-0.012 #	-0.012 #	-0.013 #	-0.013 #	0.002 #	-0.005 #	-0.000	0.003 #
SET#1 GENDER									
FEMALE	-0.011	-0.008	-0.009	-0.004	-0.005	-0.003 #	-0.008 #	-0.002	0.013 #
MALE	0.012	0.010	0.010	0.004	0.006	0.004 #	0.009 #	0.002	-0.015 #
SET#2 RACE									
WHITE	-0.000	-0.001	-0.001	-0.000	-0.001	0.002 #	0.002	0.001 #	-0.005 #
BLACK	0.001	0.002	0.003	-0.003	-0.001	-0.015 #	-0.012	-0.008 #	0.035 #
OTHER	0.001	0.003	0.004	0.006	0.007	-0.004	-0.002	-0.004	0.010
SET#3 REGION									
SOUTH	-0.013	-0.010	-0.010	-0.006	-0.007	-0.004	-0.009 #	-0.004 #	0.017 #
NORTH EAST	0.025	0.021 #	0.020 #	0.017	0.017	0.006 #	0.013 #	0.003	-0.022 #
NORTH CENTRAL	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007 #	-0.007 #	-0.006 #	0.020 #
WEST	0.000	0.000	0.002	-0.001	0.000	0.013 #	0.012 #	0.013 #	-0.038 #
HS GRADE/D=1	-0.003	-0.004	-0.004	-0.005	-0.004	-0.005 #	-0.007 #	-0.002 #	0.014 #
R WL DO 4YR CLG	0.004	0.008	0.010	0.002	0.006	-0.002	0.002	-0.001	0.001
URBANICITY	0.010	0.006	0.007	0.005	0.006	0.006 #	0.009 #	0.003 #	-0.018 #
SET#4 FOLLOW UP #									
FU #1	-0.023	-0.007	-0.005	-0.017	-0.012	0.000	-0.007 #	0.004 #	0.003
FU #2	0.006	0.010	0.011	0.001	0.003	0.001	0.004	0.000	-0.005
FU #3	0.023	0.015	0.013	0.016	0.012	-0.001	0.005	-0.003	-0.002
FU #4	0.015	-0.004	-0.008	0.011	0.005	0.001	0.001	-0.004	0.002
FU #5	-0.003	-0.033	-0.036	0.011	0.004	-0.002	0.003	-0.006	0.005
SET#5 YEARS, BY TO FU#1									
ONE YEAR	0.001	0.004	0.004	0.003	0.003	-0.001	0.001	0.000	-0.000
TWO YEARS	-0.001	-0.004	-0.004	-0.003	-0.004	0.001	-0.001	-0.000	0.000
SET#6 FU STUDENT STATUS									
FULL-TIME STUDENT	-0.010		-0.006		-0.019	-0.003	-0.009	-0.003	0.015 #
PART-TIME STUDENT	-0.019		-0.023		-0.024	0.004	-0.004	0.000	-0.001
NOT A STUDENT	0.008		0.007		0.014	0.001	0.005	0.002	-0.008 #
SET#7 FU WORK STATUS									
FULL-TIME CIVILIAN JOB	0.013		0.007		0.004	-0.000	0.002	0.000	-0.002
MILITARY SERVICE	-0.074		-0.079 #		-0.097 #	0.005	-0.055 #	-0.013 #	0.062 #
PART-TIME CIVILIAN JOB	-0.011		-0.000		0.003	0.000	0.002	0.000	-0.002
HOMEMAKER	-0.052		-0.050		-0.006	-0.004	-0.006	-0.003	0.013
NONSTUDENT, NOT EMPLOYED	0.015		0.009		0.011	0.000	0.006	0.001	-0.007
OTHER	-0.006		0.002		-0.001	0.001	-0.000	0.002	-0.002

VARIABLE	CHANGE SCORES BIV. COEFF.	BKGD.	BKGD+ STUD/WORK	BKGD+ LIV.ARR.	ALL SETS	STOP ALL SETS	START ALL SETS	BOTH ALL SETS	NEITHER ALL SETS
SET#8 FU LIVING ARRANGEMENTS									
MARRIED	-0.039			-0.044 #	-0.047 #	0.003	-0.021 #	-0.003	0.020 #
PARTNER	0.073			0.068 #	0.064 #	0.022 #	0.052 #	0.014 #	-0.088 #
PARENT(S)	-0.005			-0.002	-0.006	-0.004	-0.008 #	-0.001	0.014 #
DORMITORY	-0.013			0.008	0.018	-0.007	0.000	-0.004	0.011
LIVE ALONE	0.026			0.005	0.005	0.002	0.004	0.003	-0.008
OTHER	0.053			0.051 #	0.059 #	-0.000	0.034 #	0.004	-0.037 #
SET#9 FU PREGNANCY STATUS									
SPOUSE	-0.037			-0.021	-0.020	-0.004	-0.018	-0.003	0.024
SELF	-0.076			-0.049	-0.053	-0.003	-0.031 #	-0.008	0.040 #
NOT PREGNANT	0.003			0.002	0.002	0.000	0.001 #	0.000	-0.002 #
SET#10 FU PARENTHOOD STATUS									
MARRIED FATHER	-0.045			-0.033	-0.034	0.004	-0.017	-0.003	0.015
MARRIED MOTHER	-0.062			-0.036	-0.037	0.003	-0.016	-0.002	0.016
SINGLE FATHER	0.090			0.068	0.065	0.018	0.042 #	0.009	-0.070 #
SINGLE MOTHER	0.003			-0.010	-0.014	-0.000	-0.011	-0.001	0.013
NOT A PARENT	0.008			0.005	0.005	-0.001	0.002 #	0.000	-0.002

VARIABLE	CHANGE SCORES ETA	BETA	BETA	BETA	BETA	STOP BETA	START BETA	BOTH BETA	NEITHER BETA
BASE YEAR (76-88)	-0.0621	-0.0657 #	-0.0651 #	-0.0711 #	-0.0698 #	0.0399 #	-0.0664 #	-0.0015	0.0315 #
SET#1 GENDER	0.0198	0.0159	0.0162	0.0066	0.0102	0.0214 #	0.0367 #	0.0205	0.0484 #
SET#2 RACE	0.0011	0.0020	0.0026	0.0034	0.0034	0.0330 #	0.0184	0.0280 #	0.0428 #
SET#3 REGION	0.0253	0.0209	0.0208	0.0170	0.0172	0.0483 #	0.0450 #	0.0572 #	0.0809 #
HS GRADE/D=1	-0.0104	-0.0139	-0.0135	-0.0156	-0.0136	-0.0555 #	-0.0554 #	-0.0424 #	0.0896 #
R WL DO 4YR CLG	0.0084	0.0167	0.0197	0.0047	0.0114	-0.0139	0.0078	-0.0092	0.0047
URBANICITY	0.0189	0.0121	0.0122	0.0091	0.0104	0.0423 #	0.0420 #	0.0334 #	-0.0686 #
SET#4 FOLLOW UP #	0.0309	0.0223	0.0226	0.0229	0.0153	0.0063	0.0224	0.0300	0.0122
SET#5 YEARS, BY TO FU#1	0.0020	0.0067	0.0072	0.0048	0.0059	0.0068	0.0053	0.0014	0.0011
SET#6 FU STUDENT STATUS	0.0174		0.0160		0.0287	0.0133	0.0288	0.0195	0.0353
SET#7 FU WORK STATUS	0.0350		0.0310 #		0.0302 #	0.0084	0.0432 #	0.0215	0.0397 #
SET#8 FU LIVING ARRANGEMENTS	0.0615			0.0614 #	0.0666 #	0.0424 #	0.0964 #	0.0374 #	0.1017 #
SET#9 FU PREGNANCY STATUS	0.0240			0.0153	0.0163	0.0051	0.0253 #	0.0122	0.0263 #
SET#10 FU PARENTHOOD STATUS	0.0413			0.0269	0.0273	0.0156	0.0358 #	0.0113	0.0339 #
R sqr.		0.0059 #	0.0070 #	0.0111 #	0.0125 #	0.0138 #	0.0295 #	0.0116 #	0.0444 #
R sqr., adjusted		0.0051	0.0059	0.0099	0.0109	0.0122	0.0279	0.0100	0.0428
R sqr., reg 2/3 - reg 1			0.0012 #	0.0053 #					
R sqr., reg 2/3 - reg 1, adjusted			0.0008	0.0047					
R sqr., reg 4 - reg 3/2			0.0014 #	0.0055 #					
R sqr., reg 4 - reg 3/2, adjusted			0.0010	0.0050					

NOTE: # indicates probability <.01

[a] See footnote to Table 3.3

TABLE 6.4^a

REGRESSION ANALYSES LINKING POST HIGH SCHOOL EXPERIENCES TO CHANGES IN ANNUAL COCAINE USE--BY TO FU

	CHANGE SCORES				
VARIABLE	BIV. COEFF.	BKGD.	BKGD+ STUD/WORK	BKGD+ LIV.ARR.	ALL SETS
CONSTANT	0.209	0.209	0.209	0.209	0.209
BASE YEAR (76-88)	-0.030	-0.029 #	-0.029 #	-0.032 #	-0.031 #
SET#1 GENDER					
FEMALE	-0.041	-0.035 #	-0.032 #	-0.023 #	-0.027 #
MALE	0.049	0.041 #	0.038 #	0.027 #	0.032 #
SET#2 RACE					
WHITE	0.009	0.007	0.007	0.007	0.007
BLACK	-0.050	-0.037	-0.034	-0.044	-0.041
OTHER	-0.028	-0.030	-0.029	-0.021	-0.020
SET#3 REGION					
SOUTH	-0.066	-0.051 #	-0.053 #	-0.041 #	-0.042 #
NORTH EAST	0.084	0.068 #	0.066 #	0.058 #	0.059 #
NORTH CENTRAL	-0.012	-0.014	-0.014	-0.015	-0.015
WEST	0.020	0.022	0.025	0.016	0.020
HS GRADE/D=1	-0.010	-0.015 #	-0.015 #	-0.016 #	-0.015 #
R WL DO 4YR CLG	0.015	0.026 #	0.029 #	0.009	0.018
URBANICITY	0.037	0.025 #	0.024 #	0.020 #	0.022 #
SET#4 FOLLOW UP #					
FU #1	-0.092	-0.055 #	-0.048 #	-0.079 #	-0.063 #
FU #2	0.038	0.047 #	0.049 #	0.022	0.027
FU #3	0.074	0.055 #	0.048 #	0.056 #	0.043 #
FU #4	0.050	0.005	-0.005	0.046	0.025
FU #5	0.011	-0.060	-0.068	0.058	0.039
SET#5 YEARS, BY TO FU#1					
ONE YEAR	-0.011	-0.005	-0.004	-0.007	-0.005
TWO YEARS	0.013	0.006	0.005	0.008	0.006
SET#6 FU STUDENT STATUS					
FULL-TIME STUDENT	-0.036		-0.008		-0.040
PART-TIME STUDENT	-0.026		-0.042		-0.045
NOT A STUDENT	0.022		0.011		0.028 #
SET#7 FU WORK STATUS					
FULL-TIME CIVILIAN JOB	0.047		0.030 #		0.022
MILITARY SERVICE	-0.182		-0.197 #		-0.253 #
PART-TIME CIVILIAN JOB	-0.051		-0.022		-0.013
HOMEMAKER	-0.215		-0.195 #		-0.080
NONSTUDENT, NOT EMPLOYED	0.057		0.052		0.059
OTHER	-0.022		0.001		-0.007

	CHANGE SCORES				
VARIABLE	BIV. COEFF.	BKGD.	BKGD+ STUD/WORK	BKGD+ LIV.ARR.	ALL SETS
SET#8 FU LIVING ARRANGEMENTS					
MARRIED	-0.101			-0.115 #	-0.120 #
PARTNER	0.256			0.239 #	0.229 #
PARENT(S)	-0.032			-0.018	-0.030
DORMITORY	-0.064			0.004	0.031
LIVE ALONE	0.093			0.025	0.022
OTHER	0.160			0.144 #	0.165 #
SET#9 FU PREGNANCY STATUS					
SPOUSE	-0.045			-0.014	-0.011
SELF	-0.161			-0.074	-0.080
NOT PREGNANT	0.006			0.002	0.003
SET#10 FU PARENTHOOD STATUS					
MARRIED FATHER	-0.122			-0.121 #	-0.125 #
MARRIED MOTHER	-0.194			-0.125 #	-0.106 #
SINGLE FATHER	0.176			0.106	0.098
SINGLE MOTHER	-0.017			-0.029	-0.033
NOT A PARENT	0.025			0.020 #	0.018 #

	CHANGE SCORES				
VARIABLE	ETA	BETA	BETA	BETA	BETA
BASE YEAR (76-88)	-0.0865	-0.0826 #	-0.0817 #	-0.0901 #	-0.0882 #
SET#1 GENDER	0.0410	0.0344 #	0.0318 #	0.0227 #	0.0268 #
SET#2 RACE	0.0175	0.0144	0.0135	0.0150	0.0141
SET#3 REGION	0.0510	0.0410 #	0.0413 #	0.0344 #	0.0352 #
HS GRADE/D=1	-0.0182	-0.0261 #	-0.0255 #	-0.0285 #	-0.0258 #
R WL DO 4YR CLG	0.0159	0.0276 #	0.0315 #	0.0098	0.0190
URBANICITY	0.0367	0.0244 #	0.0240 #	0.0202 #	0.0217 #
SET#4 FOLLOW UP #	0.0626	0.0452 #	0.0428 #	0.0531 #	0.0418 #
SET#5 YEARS, BY TO FU#1	0.0107	0.0049	0.0041	0.0070	0.0053
SET#6 FU STUDENT STATUS	0.0251		0.0145		0.0309 #
SET#7 FU WORK STATUS	0.0636		0.0536 #		0.0473 #
SET#8 FU LIVING ARRANGEMENTS	0.1006			0.0942 #	0.1003 #
SET#9 FU PREGNANCY STATUS	0.0259			0.0116	0.0126
SET#10 FU PARENTHOOD STATUS	0.0635			0.0461 #	0.0425 #
R sqr.		0.0152 #	0.0183 #	0.0278 #	0.0307 #
R sqr., adjusted		0.0145	0.0172	0.0265	0.0291
R sqr., reg 2/3 - reg 1			0.0031 #	0.0125 #	
R sqr., reg 2/3 - reg 1, adjusted			0.0027	0.0120	
R sqr., reg 4 - reg 3/2			0.0029 #	0.0123 #	
R sqr., reg 4 - reg 3/2, adjusted			0.0026	0.0118	

NOTE: # indicates probability < .01

^ See footnote to Table 3.3

Table 6.5
Actual Rates of Transitions in 30 Day Cocaine Use Between Pregnant and Non-Pregnant Women
FU1-FU5

	Stop	Start	Both	Neither	H.S. 30-Day Users	% of Users Who Quit	H.S. Non-Users	% of Non-Users Who Started
Married Women								
Pregnant								
Actual	2.2	0.6	0.1	97.1	2.3	96.7	97.7	0.6
Not Pregnant								
Actual	2.3	2.4	0.5	94.7	2.9	81.3	97.1	2.5
Unmarried Women								
Pregnant								
Actual	2.8	1.5	0.3	95.4	3.1	89.4	96.9	1.5
Not Pregnant								
Actual	2.3	5.3	1.2	91.2	3.5	66.3	96.5	5.5
All Women								
Pregnant								
Actual	2.3	0.7	0.1	96.8	2.5	94.9	97.5	0.8
Not Pregnant								
Actual	2.3	4.4	1.0	92.3	3.3	69.7	96.7	4.6

Note: Because the pregnancy item was not added to the follow-up questionnaire until 1984, the n for this analysis is 20,209.